ENCE LIBRARY

SEP 8 1925

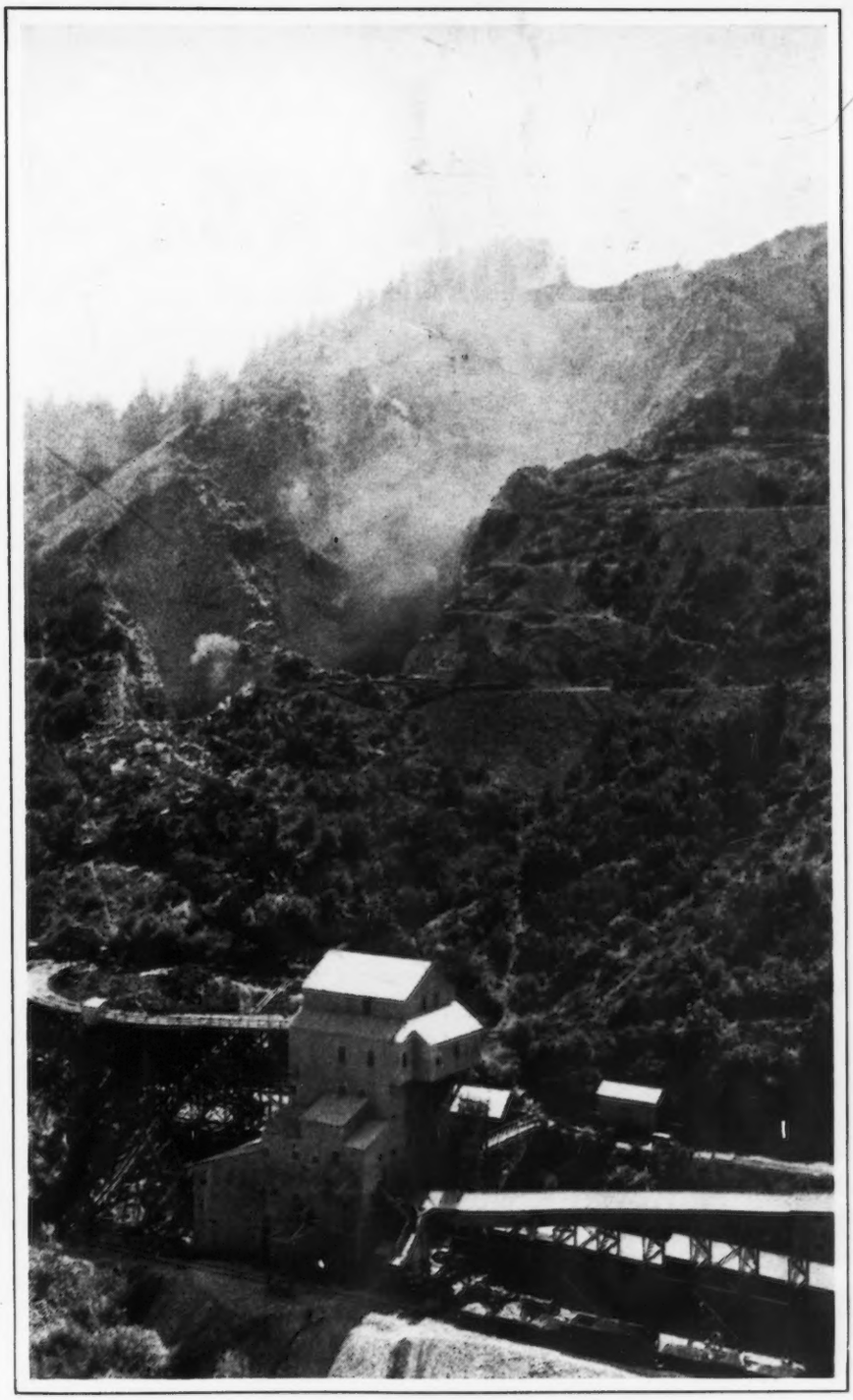
September 5, 1925

McGraw-Hill Company, Inc.

Twenty-five Cents Per Copy

ENGINEERING AND MINING JOURNAL-PRESS

A CONSOLIDATION OF ENGINEERING AND MINING JOURNAL AND MINING AND SCIENTIFIC PRESS



Quarry and Plant of the Pacific Portland Cement Company at Auburn, California

South Dakota's State Cement Enterprise

By Francis Church Lincoln

A New Hanger for Parting Doré by the Moebius System

By E. J. David

Petroleum Supply of Japan

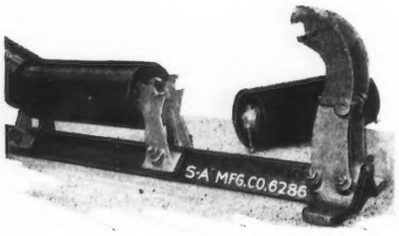
[II]

By Arthur Huber Redfield

Biography of Leland E. Wemple

Useful Operating Ideas
The Market Report
Metal Statistics

SACON
Carriers



The rugged anti-friction bearing carrier

Progress in the development and use of belt conveyors can be largely gauged by the conveyor carrier designs brought out from time to time by Stephens-Adamson Mfg. Co.

From a small beginning, where belt conveyors were used infrequently and then only for short distances, experience has proven that the belt conveyor is the simplest, most economical method of transporting materials,—and conveyors of great size and length are now not uncommon.

The Sacon Carrier shown above is a new type S-A Carrier that sets a new standard in three-pulley carriers for belts up to 48 in. wide. It is a ball-bearing, high-pressure lubricated carrier.

As in all S-A Carriers, the belt passes over the easy-running Sacon rollers with a smooth gliding action! Long belt life is assured, and the minimum of conveyor upkeep.

Write for details regarding this new carrier. Bulletin No. 143.

STEPHENS-ADAMSON MFG. CO.
AURORA, ILLINOIS
Pacific Coast Factory—Los Angeles, Calif.

ENGINEERING AND
MINING JOURNAL-PRESS

JOSIAH EDWARD SPURR, Editor

Volume 120 | New York, September 5, 1925 | *Number* 10

Ore Zones of Idaho

MAPS OF MINING DISTRICTS, showing the predominant metal in each, and the relation to outcrops of intrusive rocks, like that of Messrs. Thomson and McGonigle, published in our issue of Aug. 8, are exceedingly valuable, establishing as they do a foundation of data on which to base constructive conclusions. The conclusions of the authors themselves have been tentative, and have been confined to tabulating the average distance of each of the metals from granitic outcrops. From this tabulation it appears that the gold districts are nearest granite, on the average; silver next; lead next; and copper furthest away. The authors draw no conclusions from these figures, but the reader, thinking further, may conclude that this represents a temperature sequence, of which the gold represents the highest-temperature zone, and the copper that of the lowest temperature.

This conclusion might well be perplexing to the reader in question, if he has been a close student of the theory of ore deposition; for the normal zonal sequence as proposed by Spurr and generally accepted is gold-copper-lead-silver. This sequence, while undoubtedly the normal temperature sequence, is, to be sure, in many cases, disturbed or even reversed; nevertheless, on a large scale, it is usually discernible, and frequently plain.

A little closer scrutiny of the data presented in the Idaho map is therefore logical. A method suggested is to represent on the map the different metals each by a distinct color, and to join together, by closing intervening spaces, groups of dots of one color. When this is done it is seen that the gold districts fall distinctly into special broad areas, and that areally the gold regions thus outlined are the most important in the state. There is a distinct gold belt (consisting of three large areas) which crosses the state in a northeasterly direction, for 220 miles, from Silver City to Lemhi County, which includes forty-six districts of the 89 gold districts mapped; and a north-south belt, 170 miles long from Valley County to Shoshone County, which includes twenty-five districts; besides seven smaller more or less isolated areas comprising eighteen districts in all, of which the largest, running northeast from Cassia County and into Bingham County, contains five districts. Comparison of these gold areas with the areas of granitic outcrops shows that there is a conspicuous lack of detailed space relation between the two, in spite of the average distance relations tabulated by Messrs. Thomson and McGonigle. The apparent conclusion from this is that the quartz ores did not crystallize at the time of the crystallization of the granite surface now exposed, but at a different and probably a later period: hence the lack of close zonal relations. A falling temperature at the plane of the present surface, due no doubt to the cooling of the granite batholith, is thus illustrated; and this corresponds with the recorded observation that ten of the gold districts "lie practically within the granite." In other words, the areas of gold-quartz crystallization overlap upon those of granite crystallization; and there is a marked difference exhibited in space occupied as well as in time. Nevertheless, the relatively close association of granite and gold-quartz (the latter, as has been elsewhere recorded, closely associated in places with pegmatite) is exhibited by this areal study.

Turning next to the copper districts, of which twelve are mapped, five occur on the flanks of much larger gold-bearing areas, suggesting a neighborly temperature relation between gold and copper, which, in so far, is in agreement with the normal sequence called for by the Zonal Theory. One other copper deposit (in Bonneville County) is in close juxtaposition to a gold district, with no lead or silver district mapped near by. But the largest copper area, comprising three districts, runs northeasterly some fifty miles from Custer County to Clark County, and is not only not related to granite outcrops, but is also not connected with areas of gold-quartz outcrop. This copper district is flanked on three sides by distinct lead areas which include thirteen out of the twenty-eight districts mapped in the state (the region around Wallace, in Shoshone County, comprising nine of the other fifteen mapped). And, in areas so disposed that they constitute a rough zone outside of these three lead areas which flank the chief copper area in Custer-Butte-Clark counties, are four silver areas, comprising ten out of the thirteen mapped in the state. Of the other three areas, one is on the flank of the Wallace lead area and two, near Silver City, are close to two lead areas. This rude relation, areally and quantitatively considered, would support the normal sequence copper-lead-silver for this region. It is true that the outer zones of this region—the lead zone and especially the silver zone—impinge upon and even overlap the major gold zone which runs northeast from Silver City of Lemhi County, so that many of these lead and silver districts are close to the gold districts, and also close to the granite. Numerically tabulated, they give rise to the average close areal relation of silver and lead districts to the granite, given by Messrs. Thomson and McGonigle, the silver having the closest relation. But this areal relation is clearly not a contemporaneous one, as will be seen; but is due to the crystallization of the group of copper, lead, and silver areas which lie in and around Custer County, at a later period and at an average lower temperature than the crystallization of the gold quartz. This juxtaposition due to superimposition of distinct metal zones is also shown in Shoshone County, where not only gold-quartz ores but tungsten ores are found close to the lead-silver ores. Indeed, Messrs. Thomson and McGonigle remark that in some districts gold veins occur "within a few hundred feet of lead veins."

Taken altogether, the data indicate that magmatic

crystallization took place with falling temperature, due to the cooling of the batholith whose upper protuberances now outcrop. First came the crystallization of the granitic areas now exposed; at a later period, when the focus of heat had sunk, the gold-quartz veins crystallized, together with some copper further away horizontally (as well as vertically) from local major heat foci; still later, when cooling at the present surface had further progressed, there were introduced and crystallized the copper, the lead, and the silver ores of the area around Custer County, and the lead and silver ores of Shoshone County.

Simpler Tax Laws

AN EDITORIAL in a recent issue pointed out the temptation to dishonest and fraudulent practices arising from the complexity of the Federal Income Tax laws. Employees and former employees of the Bureau of Internal Revenue have operated in collusion with attorneys and agents practicing before the Bureau. During 1924 and 1925 seventeen such attorneys have been disbarred from further practice on charges preferred against them and found proven by an investigating committee. Here are some typical charges: "Accepting bribe to pay a confederate in the Income Tax Unit to decide a tax case"; "contracting with deputy collectors to refer tax payers to him on commission basis"; "handling taxpayers' cases before the department on which he had reported while employed as an internal revenue agent"; "having arranged with employee of Income Tax Unit to supply lists of tax payers liable for extra assessments"; "improper possession of confidential information concerning a tax payer's case, and use of that information to solicit the case."

These disbarments are significant for two reasons: First, they show that the Treasury Department is aware of the fraudulent practices and that the officials are trying to stamp them out. Second, and this is more important, they show that dishonest activities are too general. In spite of all efforts of these presumably shrewd —even if unscrupulous—men to cover their tracks, cases have been proved against them. It is a fair assumption that a much larger number of similar cases have gone undetected and unproven, usually, no doubt, to the financial detriment of the government at Washington.

The trouble is with the law. Tax liability must be definitely ascertainable. Some method must be found by which less will depend upon the judgment of minor individual officials, who too frequently are subjected to pressure, financial, political, or other, that they cannot withstand.

Russia Places Technicians on Proletarian Level

RUSSIA is at last beginning to realize that without the technician, engineer, and specialist industrial progress cannot be maintained, for another step on the road of Russia's return to normal conditions of economic life was marked recently by a resolution of the Central Executive Committee of the Communist Party regarding better treatment of "specialists," that is, "technicians" and "white collar" men, in Soviet business and industrial administration. They are to have new rights, among which are (1) admission of their children to all branches of the educational system, (2) admission of specialist representatives as assistant judges in law cases concerning specialists and their work, (3) improvement in housing conditions and facilities of all kinds which will contribute to the accomplishment of their work, including free access to foreign technical knowledge and publications.

While the State owns and operates the majority of the large enterprises, the actual management is given over to a board of specialists controlled by a small number of trusted Communists, who have learned to co-operate without much friction. One of the main difficulties in maintaining this system of business management has been the distinction made between manual workers and clerical staffs, technicians, and managers. The former were considered proletarians; the latter bourgeois. The resolution recently published aims at wiping out this distinction, and putting technicians, engineers, specialists, and managers on a privileged footing equal to manual workers.

All this is tantamount to recognition of specialists as valuable to the proletarians. It may well appear as the final capitulation of so-called communism in the face of economic realities which have brought about such changes in the last four years.

The Importance of South Africa

VARIED SIGHTS meet the gaze as one looks out from the windows of the *Mining Journal-Press*. A short distance away lies the Hudson in its magnificence; below it the Harbor, and in full view of the editor the ships of all nations come and go, the shuttles of trade and travel that weave the fabric of commerce and intercourse between the nations. Most prominent among them is the huge "Leviathan," that, for all its size, slips quietly at regular intervals into its berth and out again. Farther down toward the Bay, but still in sight, lie the great Cunarders and the vessels of the White Star line, which have definite times of sailing. But it is the host of smaller ships, tramps and those with regular ports of call, that make up the bulk of the tonnage and that carry most of the merchandise exchanged with foreign countries. Visible reminders all of the interdependence of the nations of the earth.

Industries as well as nations are dependent on each other. At intervals it takes a war or some other great calamity to jolt people into realization of this fact—and as the realization dawns, their insularity passes. To many South Africa seems quite remote and might as well be on another planet, though it is really very near. But its mines produce the larger part of the world's supply of gold and diamonds, and in return they purchase huge quantities of goods—a large proportion coming from abroad. Last year, in 1924, of the £16,097,000 of materials and supplies that the gold, diamond, coal, and other mines required for their needs, 40 per cent was bought from American manufacturers. Coal-cutting machines, rock drills and their spares, timber, cyanide, hand tools, lubricants, gasoline, kerosene, rails and pipe fittings made up the larger part. Belting, zinc, air hose, fuse and caps, wire rope, and shoes and dies for stamp mills also figured prominently.

Should this market and others like it be cut off, even for a limited time, the effect here would soon be felt and prosperity would slacken correspondingly. Thus South Africa is very near—and dear—to us. The ships now passing down the river most likely have some cargo for its mines.

Bulletins Galore

GOOD WORK is being done in the Bureau of Standards of the Department of Commerce. Its record has been an excellent one. But perhaps it is too generous with its bulletins at times. The last mail brings copies of government "master specifications" for cotton sheets, surgical pads, denim both blue and brown, airplane cloth, and similar things that can hardly be taken for mining supplies—all of which found their way into that useful waste basket, because no other use could be made of them. The Bureau's practice has been simplified too much. It apparently has but one mailing list for all its publications, whereas it should have several lists for the various groups of industries. A slight economy might thus be made, which would add further to an economical administration's laurels.

Power From Tides

HARNESSING THE TIDES to generate electric power on an unprecedented scale is sure to eventuate. But when? Dexter P. Cooper, builder of the great dam across the Mississippi at Keokuk, Iowa, and engineer for many big hydraulic projects, says that he is prepared to devote the rest of his life if necessary to a scheme for utilizing the unusually high tides on the Bay of Fundy, in Maine. Stated briefly, the plan is this: Two narrow-necked inlets are to be dammed off to form huge pools with areas of 100 and 50 square miles respectively, each with connecting gates to the bay. Between the two pools will be a long separating wall, on which the power-generating plants will be erected. The gates to the upper pool will be kept open only during periods of rising tides; those of the lower pool only during periods of falling tides. By this simple arrangement it will be possible to keep a continuous stream of water flowing through the turbines built in the separating wall. The plan, from an engineering standpoint, is perfectly practicable; no new principles of hydraulics, no new machines of any kind, are required.

The problems are economic and political. Part of the site lies in Canada, and some complications may arise because of the prejudice of the Canadians against selling power outside of their own country. Maine must also alter its laws to permit power generated in the state to be sold elsewhere, but for that purpose a referendum will be submitted at an election on Sept. 14. These difficulties doubtless will be overcome, political boundaries will yield to industrial need.

The economic obstacles for the present are more serious. Mr. Cooper's preliminary estimate of the cost is $100,000,000, but the actual expenditure might easily be double this or even more. Dams must be built in water as much as 200 ft. deep in places. About 9,000 linear feet of dam, all told, is estimated. But the money doubtless will be forthcoming when capitalists are convinced that the market for electric power is great enough to absorb a reasonable proportion of the output to be created. The potential production is stupendous; it will dwarf the largest of existing power plants and is enough to supply a large part of the northeastern group of states.

Whether or not Mr. Cooper lives to see his very practical dream come true, the idea is enough to stir the imagination of everyone; and the man who devotes his energy to advancing the project need not feel that his efforts have been futile.

Mining Student Criminals

THE "RISING CRIME TIDE" is the theme of a series of articles by Richard Washburn Child in recent issues of a well-known publication. It is a subject that warrants most serious consideration. Today it is easier to get away with murder, literally, than ever before in the country's history. Modern inventions have speeded up and otherwise aided the work of criminals, making their apprehension difficult. Worst of all is the attitude of complaisance on the part of the public. It is here the trouble lies. It is only when such things as hold-ups fall within the experience or observation of the average man that he gives them serious attention and begins to wonder if it isn't necessary to pass a law to stop them. Recently in Butte the attempted robbery of an amusement park met with failure and the two bandits were placed in jail. It is astonishing to learn that the two were mining students from a Mid-West school, working in the copper camp during the summer months, and that they were president and vice-president, respectively, of their junior class. This is difficult to understand from every viewpoint. One is led to suspect that, after all, among those engaged in mining there are some whose moral sense is dwarfed and stunted.

Doctor Miethe

NO PRESS AGENT will be needed by the discoverer of transmutation. Reporters will camp upon his doorstep. Publicity seems easily obtained for the merest effort made in this direction. Frequent bulletins from Germany state that Dr. Adolph Miethe is still "succeeding" in changing mercury to gold. As matters stand, Dr. Miethe can say anything he chooses, without much fear of contradiction. His task is very simple—that of changing mercury to gold—a rearrangement or change in number of the planetary electrons in the atom being all that is thought necessary. A very simple thing this seems, one that physical chemists have come to understand, and the only reason why it has not yet been done is because no one has seen just how to do it. But it may be done tomorrow, so scoffers should beware. In the meantime the Berlin reports are interesting. Dr. Miethe may be mistaken, but it will be hard to prove it. If he be correct, however, the skepticism he meets with must be difficult to bear.

Charles F. Chandler

THE PASSING of Charles F. Chandler, whose obituary appears on page 390 of this issue, brings to mind a host of pleasant recollections of this genial man, who for almost half a century was associated with the Columbia School of Mines, which he helped to organize. It was principally as a lecturer in general chemistry during their first two years that the large number of mining and other engineering students knew him. His subject was rich in human interest, and with his wide knowledge and experience, coupled with a love for humor, he made his courses something that were appreciated and long remembered. In his latter years he retained his youthful vigor in a way that was astonishing. Few realized that he had reached and passed the allotted span of life. His career was a distinguished one. He was a factor in building up the reputation that the school with which he was associated has long enjoyed. His death is noted with regret.

Metallurgists of Note

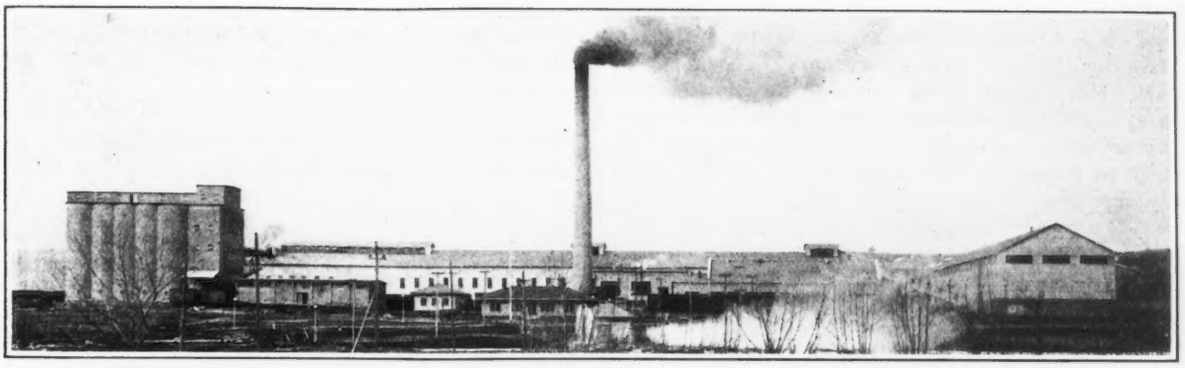
Leland E. Wemple

COMBINING the elements of the efficient executive with a keen, analytical mind which has the capacity to work out solutions of scientific problems through exhaustive study and research, Leland Edward Wemple, president of the Illinois Zinc Co., has had a career of uninterrupted progress. An active figure in varied branches of metallurgy since 1909, Mr. Wemple has made many valuable contributions to his profession in publications and technical discussions. Two of his outstanding achievements have been the perfection of processes which made possible the de-arsenizing of lead, patented in 1911, and the zinc oxide refining process which was given to the industry in 1918. Both of these are now in commercial use. Born in Waverly, Ill., on March 12, 1886, Mr. Wemple is a comparatively young man for the important position that he holds. He attended Illinois College from 1902 to 1904, completing his studies at the Massachusetts Institute of Technology, where he was graduated with a B.S. degree in metallurgy and chemistry in 1908. The following year he became associated with the Hoyt Metal Co. as superintendent of smelting operations, a connection which was maintained until 1912. It was while he was with this company that he invented the process for de-arsenizing lead and its alloys. At that time Mr. Wemple joined the forces of the American Zinc, Lead & Smelting Co., where he was first appointed assistant manager of smelters and later became manager of the oxide department during the trying war period when numerous expansions were made. He resigned in 1923 to become vice-president in charge of plants of the Evans Lead Co., Cleveland, manufacturers of oxides. The fatal illness of the chief owner of that company terminating the plans for expansion, a few months later Mr. Wemple accepted the position of vice-president and general manager of the Illinois Zinc Co., following the resignation of E. H. Wolff, and early in 1925, succeeding Benjamin G. Wells, was elected president of the company and also president of the subsidiary organization, including the Peru Mining Co. and the Peru, LaSalle & Deer Park R.R. Co. The company has recently made numerous improvements in its smelter and rolling mill, has acquired mines to assure an ore supply, and with a coal mine at its plant, seems on the road to assured and increasing prosperity, with a record of nearly half a century of operation behind it. The scope of Mr. Wemple's experience has afforded a background on which has been built one of the most interesting figures of the present generation of metallurgists. In recent years several papers which he has prepared have found widespread discussion and comment: notably, "Lead-free Zinc Oxide," which appeared in the *American Paint Journal* in 1918, and "Zinc Refining," presented before the American Institute of Mining and Metallurgical Engineers in 1918. Among Mr. Wemple's addresses of note are: "Manufacture of Zinc Oxide," delivered before the American Zinc Institute in 1920; "The Use of Zinc in Paint," before the Paint Superintendents' Clubs of St. Louis, Louisville, and Toronto in 1921 and 1922; "Smelters' Viewpoint," an address which attracted marked attention at the April, 1925, meeting at St. Louis of the American Zinc Institute; and another address which won wide attention, "Sheet Zinc," given before the National Hardware Association at Cleveland in May, 1925. Mr. Wemple has been generous in sharing his knowledge and experiences with others. He is diplomatic and tactful, has a well-balanced personality, and is the kind of man in whose progress his friends take great personal pride. He is a member of the American Institute of Mining and Metallurgical Engineers, the American Chemical Society, a director of the American Zinc Institute, a position to which he was recently elected; a member of the American Society of Testing Materials and of the National Paint, Oil and Varnish Association.

LELAND E. WEMPLE

He married in 1911 Miss Ona Hileman, and has three children, Edward, George, and Ann.

Mr. Wemple appreciates the value of play as well as work, and is a member of several clubs, including the Missouri Athletic Association of St. Louis, the Engineers Club of New York, and Phi Kappa Sigma.



General view of South Dakota's cement plant at Rapid City

South Dakota's State Cement Enterprise

Notes on Geology, Mining, Crushing, Burning, and Grinding

By Francis Church Lincoln
Department of Mining, South Dakota School of Mines

THE STATE OF SOUTH DAKOTA is now producing portland cement in a plant of 2,000 bbl. daily capacity, which it recently erected near Rapid City. This modern wet-process plant, electrically operated, and equipped with waste-heat boilers, cost approximately $1,817,000. It is unique in being the only state-owned cement plant in the United States.

Ground was broken on May 15, 1923, and the first carload of cement was shipped on Jan. 26, 1925. The plant is under the direct control of the South Dakota State Cement Commission. The business is managed by Paul E. Bellamy, who is secretary-treasurer of the commission. William Fowden, a cement plant man of wide experience, is superintendent; and William A. Ernst, an expert cement analyst, is head chemist.

Rapid City is a flourishing town with a population of 7,000, located in western South Dakota on the eastern margin of the Black Hills. It is served by three railroads: the Chicago & North Western, the Chicago, Milwaukee & St. Paul, and the Rapid City, Black Hills & Western, which connects with the Burlington on the western side of the Hills.

The cement plant and lime quarry occupy a site on the Chicago & North Western Railway two miles northwest of Rapid City. The shale quarry is situated on the railroad eight miles to the eastward of the plant. Gypsum is at present purchased from the Dakota Plaster Co., which operates a quarry at Blackhawk, four miles to the northwest; but deposits exist on cement plant ground near the lime quarry which may be opened later. Coal is purchased from the Sheridan district in Wyoming.

Geology—The Black Hills have been formed by the erosion of a great dome-shaped uplift about 125 miles long by 60 miles wide. They consist of a central mass of Algonkian schists, granites, and associated rocks, surrounded by a series of sedimentary rocks that range in age from Cambrian to Cretaceous and dip gently outward from the Algonkian core. The Cambrian beds form an irregular elliptical escarpment facing the central crystalline core, and each successive formation dips in turn beneath a younger one until the Upper Cretaceous Pierre shale is reached at the outer margin of the uplift.

The limestone quarried at the cement plant is the Minnekahta, which lies about one-quarter the distance from bottom to top of the gently dipping sedimentary rocks and is probably of Permian age. It rests conformably upon the Opeche formation, consisting of red shales and red slabby sandstone, which is also probably Permian. The Minnekahta is a hard thin-bedded limestone of light gray color with a pinkish to purplish cast, suggesting its former name of "purple" limestone. In thickness, it varies from 30 to 50 ft., being about 40 ft. thick at the cement quarry. Its composition at the quarry, according to analyses of samples from three 38-ft. well-drill holes made by Charles Bentley, of the Mining Experiment Station at the State School of Mines, averages as follows:

Constituent	Per Cent	Constituent	Per Cent
Silica	2.92	Sulphur trioxide	0.06
Alumina	0.54	Loss on ignition	42.37
Ferric oxide	0.46		
Lime	53.40	Total	100.21
Magnesia	0.46		

The gypsum that is added to the cement as a retarder comes from the Spearfish formation, or Red Beds. This formation conformably overlies the Minnekahta limestone and is perhaps of Triassic age. It consists of from 600 to 700 ft. of red sandy shale and soft red sandstone containing beds of gypsum.

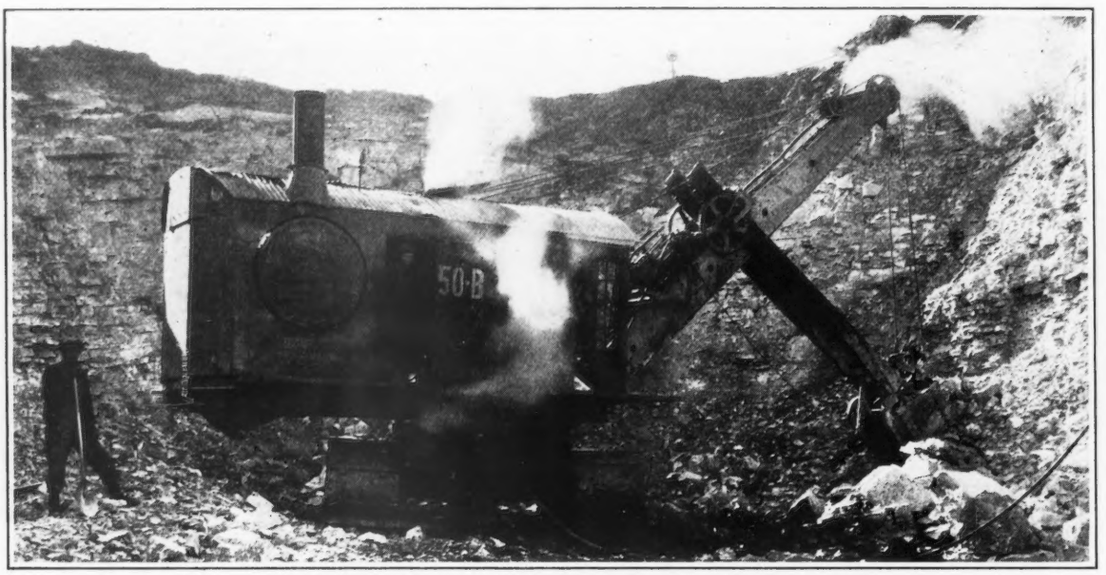
Between the Spearfish formation and the Pierre shale intervene a number of thin formations of Jurassic and Lower Cretaceous age, and of thick formations belonging to the Colorado group of Upper Cretaceous age. Analyses show that the Graneros shale of the Colorado group, which may be obtained nearer the cement plant than the utilized Pierre shale, could be employed satisfactorily in the manufacture of portland cement. However, it contains less iron and therefore would not burn so readily as the more distant Pierre shale.

The Pierre shale, which is quarried for the clayey component of the cement mix, belongs to the Montana group of the Upper Cretaceous and rests conformably

upon the Niobrara limestone, which is the upper member of the Colorado group, and is unconformably overlain by Tertiary and Quaternary deposits. It is a dark bluish-gray shale weathering dark brown, 1,200 ft. in thickness, with scattered limestone lenses at two horizons and numerous small clay ironstone concretions in its middle and upper parts. A 30-ft. shaft

The cost of quarrying and crushing the limestone and delivering it to the raw materials storage building is 6c. per barrel of cement, equivalent to about 24c. per ton of limestone.

The shale at the quarry is soft enough to be mined and loaded by steam shovel without blasting. A type 20B Bucyrus Diesel shovel with caterpillar traction is



Mining limestone with a caterpillar-tread steam shovel

in the Pierre shale at the cement plant shale quarry averaged as follows:

Constituent	Per Cent	Constituent	Per Cent
Silica	56.32	Manganese dioxide	0.86
Ferric oxide	7.11	Sulphur trioxide	1.14
Alumina	18.84	Loss on ignition	10.19
Lime	2.09		
Magnesia	2.70	Total	99.25

Quarrying—The limestone at the cement plant quarry varies from 37 to 41 ft. in thickness, averaging about 40 ft., and carrying little or no overburden. A quarry face is being developed by driving a cut 60 ft. in width into the limestone. The face of this cut is now 32 ft. in height. Blast holes are bored with a 5⅝-in. Sanderson-Cyclone gasoline well drill. Drilling progresses at the rate of about 5 ft. per hour. A round consists of four holes, spaced 18 ft. apart, set 18 ft. back from the face, and sunk 2 ft. below quarry grade. The round is loaded with 600 lb. of 40 per cent gelatin dynamite and fired by electricity, two detonators being placed in each hole. This breaks about 2,400 tons of limestone, or four tons per pound of explosive.

Little secondary blasting is necessary, as the rock shatters well. For blockholing the few boulders that are encountered, two Ingersoll-Rand Jackhamer drills are provided, furnished with compressed air from a 12x10 single-stage Ingersoll-Rand air compressor located in the quarry blacksmith shop. This secondary blasting, like the primary, is performed with 40 per cent gelatin dynamite.

Steam-Shovel Loading

The broken limestone is loaded by a type 50B Bucyrus steam shovel equipped with caterpillar tread into 5-ton side-dump cars running on a 36-in. gage quarry track. A 20-ton 11x16-in. saddle-tank Porter locomotive hauls the quarry cars to and from the nearby crusher house.

employed. The shale is broken so fine during the mining process that no further disintegration is necessary; a shale-disintegrator house erected at the shale quarry has not been used. The shale is loaded into standard-gage railroad cars, which are transported the eight miles from the shale quarry to the raw materials storage building at the plant on a railroad switching charge. The cost of shale delivered at the plant is 2½c. per barrel of portland cement, equivalent to about 40c. per ton of shale.

Crushing and Mixing Raw Materials—When the quarry cars loaded with limestone arrive at the crusher house, they are dumped directly into the mouth of a 20-in. Superior McCully gyratory crusher. The limestone, broken to about 4 in. maximum diameter, is next conveyed to a 36x42-in. Jeffrey swing hammer pulverizer, which reduces it to about ¾ in. maximum diameter. It is then carried 350 ft. on a 24-in. belt conveyor to the raw materials storage.

This storage building is 80 ft. wide by 408 ft. long and is used for the storage of shale and coal as well as of limestone. A 6½-ton electric crane equipped with a 2½-cu.yd. clamshell bucket travels the full length of the structure. A standard-gage railroad track enters the building, and the shale and coal cars arrive upon this track and are unloaded by the crane. The crane also delivers the shale and limestone to the two-compartment loading bin. Shale is placed in one compartment and limestone in the other. Feeders at the bottom of each compartment are so arranged as to deliver limestone and shale in any proportion that may be desired. The mixed limestone and shale fall upon a 24-in. belt conveyor 130 ft. long, which carries the mixture to two steel bins in the main mill.

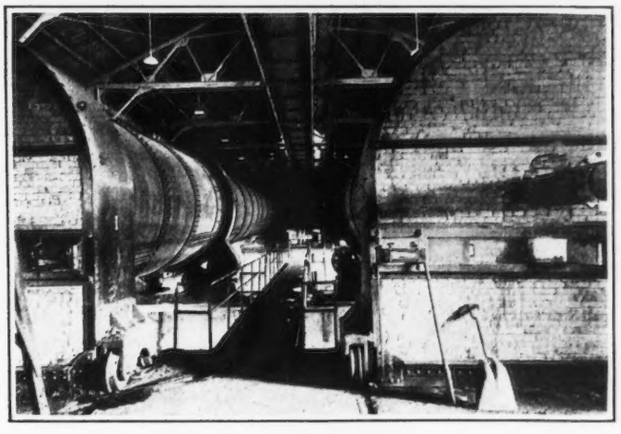
The raw materials are now ground fine with the addition of water in two Compeb mills to form a pulp

known as "slurry" in cement parlance. The Compeb mills are two-compartment ball mills employing balls 2½ to 5 in. in diameter in the first and smaller compartment and 1¼ in. in diameter in the second and larger one. They reduce the raw materials in one operation from coarse particles the maximum diameters of which exceed ¾ in., 95 per cent of which will pass a 100-mesh screen.

The discharge from the Compeb mills is caught in a slurry pit, from which it is pumped to any one of six cylindrical reinforced-concrete tanks 20 ft. in diameter by 40 ft. in height. The slurry in each of these tanks is stirred continuously by compressed air, which mixes it thoroughly and prevents it from settling. A second slurry pump forwards the slurry from any one of the six slurry tanks to either of two correction tanks, 20 ft. in diameter by 20 ft. high. In these tanks slurries from different slurry tanks are blended to produce a kiln feed of the correct chemical composition.

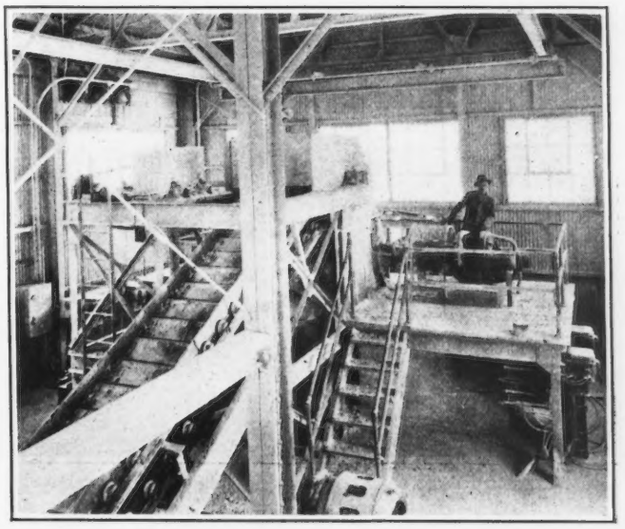
Good cement can be manufactured only when the analysis of the kiln feed is kept within narrow limits. The percentage of calcium carbonate that should be present varies with the composition of the raw materials employed, and at Rapid City is 75. This calls for nearly four parts of limestone to one part of shale in the raw mix; or, since about 625 lb. of raw materials is required at this plant to make a 376-lb. barrel of portland cement, about 500 lb. of limestone and 125 lb. of shale per barrel. Owing to local variations in composition, it is impracticable to mix the limestone and shale in exactly the proper proportions where they are first brought together beneath the loading bin. Instead of attempting to get as close as possible to the desired mixture at that point, the differential feeder is set to deliver a low-lime mixture containing about 68 per cent calcium carbonate until one slurry tank is filled, and then changed to give a high-lime slurry with about 80 per cent calcium carbonate until the next slurry tank is filled with this mixture. The contents of the high-lime and the low-lime slurry tanks are carefully analyzed, and a correction tank filled from them by pumping in the proper proportions of the two slurries to bring the calcium carbonate content to 75 per cent.

Burning the Raw Mixture—The slurry is burned to clinker in two rotary kilns having inside diameters of 10 ft. and lengths of 150 ft. Upon entering a kiln, the slurry is subjected to a temperature of about 1,000 deg. F. The rotation of the slightly inclined kiln feeds the slurry forward, and the temperature gradually increases until it reaches a maximum of about 2,500 deg. F. in the hot zone near the discharge end of the kiln, where the slurry becomes fused to a clinker. The material passes through the kiln in about three hours.



Rotary clinkering kilns

There are two 10 ft. in diameter and 150 ft. long. They are fired with pulverized coal.



Pan conveyor for 4-in. rock

Feeding limestone to the swing-hammer pulverizer.

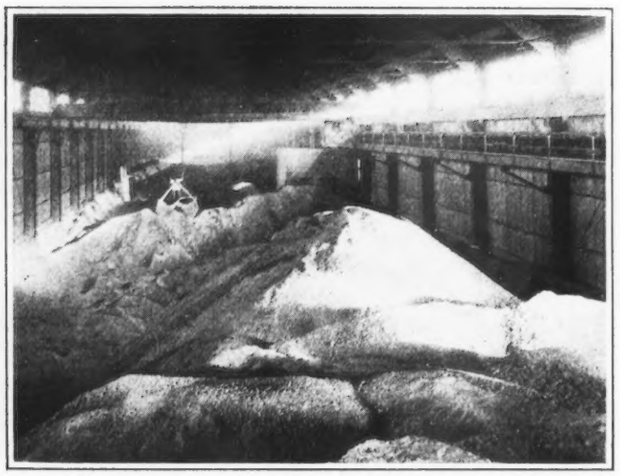
The fuel is pulverized coal. Different coals have been tried, the best requiring 136 lb. coal per barrel of cement. The waste gases from the kilns go to the waste-heat boilers, which produce sufficient steam to supply power to the entire plant.

The hot clinker from the rotary kilns drops to two rotary coolers 8 ft. in diameter by 60 ft. long, which preheat the air going to the kilns. The clinker is then carried to an outside storage pile by means of a pivoted-bucket conveyor. This same conveyor runs in a tunnel beneath the storage pile and reclaims the clinker, delivering it to two bins above the finishing grinders.

Pulverized Coal Plant—The coal used is 2½-in. Sheridan screenings. It is brought to the pulverizing plant in railway cars, which discharge into a track hopper. A 30-in. apron conveyor transports the coal to a pair of Link-Belt 26x24-in. type A toothed rolls. The crushed product is elevated to a raw coal bin, from which it is fed to an Ebro drier 7 ft. in diameter by 50 ft. long. The dried coal drops into a pit, from which it is lifted by an elevator to the bins above three Raymond five-roller mills.

The Raymond mills pulverize the coal until 95 per cent will pass a 100-mesh screen. The cyclones connected to these mills deliver the powdered coal to a screw conveyor, which carries it to the pulverized coal bins in front of the rotary kilns. The coal is introduced into the discharge end of the kilns by means of burners, through which it is forced by the blasts of air from 50-in. high-speed fans.

Power Plant—The hot gases coming from the kilns go to two Babcock & Wilcox waste-heat boilers of 6,694-sq.ft. heating surface each. These boilers are equipped with Green fuel economizers and with superheaters, and generate all the steam necessary to operate the entire plant under ordinary conditions. A 300-hp. auxiliary boiler is installed for starting the plant and for emergency use. The steam operates two 1,000-kw.



Raw materials storage bin

Crushed limestone, shale, and coal are reclaimed with a clamshell bucket

2,300-volt turbo-generators, which supply electric power for the motors running all the machines in the plant.

The electrical installations include one 25-kw. turbo-generator exciter, one 27½-kw. motor-generator set, three 333-kv. single-phase transformers, and 2,300-volt and 440-volt switchboards. The power plant also contains two 12x10-in. single-stage air compressors of 324-cu.ft. capacity, and two air receivers of 860-cu.ft. capacity at 100 lb. pressure.

Grinding Clinker and Gypsum—The clinker and gypsum are ground in two dry-grinding Compeb mills of similar construction to those used for wet-grinding of the raw materials. The gypsum is received at the plant in a crushed condition, with maximum lumps of about ¾-in. diameter. From 3 to 3½ per cent of gypsum is added to the cement clinker before it is pulverized in the Compeb mills. This gypsum acts as a retarder that regulates the time of set of the cement when used.

The discharge from the Compeb mills is the finished portland cement. Elevators and conveyors transport the cement to the stock house, which consists of six bins of the silo type, 32 ft. in diameter by 72 ft. high, arranged in two rows of three bins each. These silos with the interstices between bins have a combined capacity of 100,000 bbl. of portland cement. The cement is withdrawn from storage and carried to the packing house bins by means of conveyors and elevators. There are two packing machines, which automatically weigh the cement and pack it in bags. A 30-in. belt conveyor carries the filled sacks to the door of the freight car in which they are to be shipped.

The product of the plant is packed in standard cement sacks of 94 lb. net weight. Each sack is marked with the brand "Dacotah Portland Cement" in a circle surrounding the head of an Indian.

The analysis of the cement is as follows:

Constituent	Per Cent	Constituent	Per Cent
Silica	22.23	Magnesia	1.83
Alumina and ferric oxide	10.57	Sulphur trioxide	1.72
Lime	62.28	Ignition loss	0.71

Tests conducted by the South Dakota State Highway Commission in its materials testing laboratory at Pierre gave the following results: Per cent retained on 200-mesh screen, 19.93; steam test for soundness, O.K.; initial set, vicat needle, 3 hr.; final set, vicat needle, 4½ hr.; tensile strength per square inch cross-section, average, 299 in seven days and 455 in 28 days.

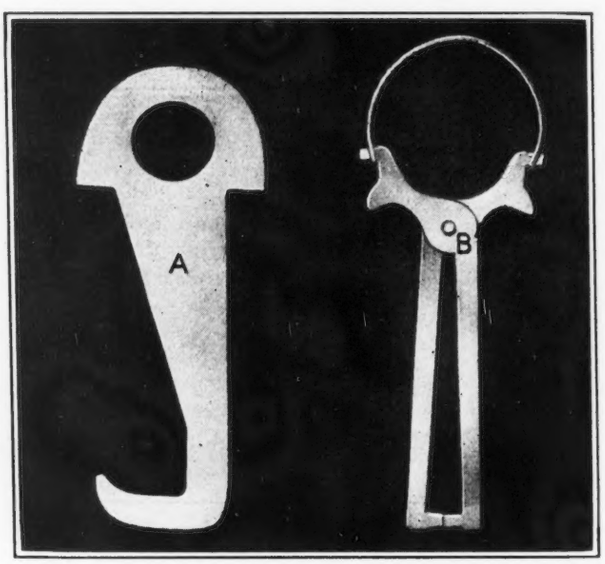
A New Anode Hanger for Parting Doré by the Moebius System

By E. J. David

Superintendent Electrolytic Refineries, Raritan Copper Works

The type of anode hanger used for parting doré by the Moebius system at the refinery of the Raritan Copper Works was not altogether satisfactory until recently. In the accompanying photograph, the new type of hanger, marked *A*, and the old type of hanger, *B*, are shown. The faults with the old type hanger that necessitated the introduction of the new were as follows: First, hanger *B* was made of brass, nickel plated, with a half round spring to maintain a tension on the jaws of the hanger. At the contact point between the lug of the anode and the jaws of the hanger an accumulation of copper nitrate would form. This would bring about high resistance at the point of contact, with the resulting excessive heating of the contact points of the hanger, even to the extent of heating to redness. This in turn would burn holes in the 8-oz. army duck material that inclosed the anodes, which opened up a way for the gold slime to creep outside the filter medium and be washed by the electrolyte into the silver crystal compartment of the cell. Another effect of the high resistance of the anode was the rapid corrosion of the hangers; replacement was often necessary and hangers usually lasted only about a week. Another fault in this *B* type hanger was that salt, copper nitrate, or silver nitrate would creep around the binding screw and also out on the contact points of the hanger, producing bad contacts and interfering with corrosion of the anodes.

With these defects in mind I designed the hanger as shown in the photograph marked *A*, which is made of pure silver. The first hanger tried was cut from a piece of silver sheet, 0.05 in. thick, and proved to be successful. Eventually the whole system was equipped with this type of hanger. Overheating of the hanger through bad contacts has been eliminated. Inasmuch as some have been in service since 1918, they can be considered practically indestructible. The only objection that might be entertained against the new type of hanger is the fact that it is made of silver, but the amount needed would not add greatly to the metal carried in the inventory of a silver refinery.



New type of hanger, marked "A," compared with old, "B"

The Petroleum Supply of Japan—II[1]

Production of Crude Oil and Commercial Control—Consumption and Refining

By Arthur H. Redfield
U. S. Geological Survey, Washington, D. C.

AT THE time Clements made his estimate, about 45,000,000 bbl. of crude oil had been produced in Japan. At the end of 1924, about 49,000,000 bbl. had been produced. The remaining estimated reserve of 86,000,000 bbl. in "proved" ground would permit production to continue at the normal average rate for the last ten years of about two and one-third million barrels per year for about thirty-seven years, or at a rate of two million barrels for forty-three years. Indeed, production will probably continue much longer than this, as under the normal conditions of drilling wells and developing oil fields the remaining oil would not be removed within that period of time. But instead of maintaining uniform rate, production from the oil wells will slowly but steadily decrease over a period of many years, with an occasional small spurt shown by the opening of a few isolated new wells.

Nothing definite can be said, in advance of drilling, of the possibilities of petroleum in the "probable" areas. Thorough testing of these areas is very desirable and may add much to Japan's oil reserves.

The estimate for the "possible" areas is recognized by Clements himself as purely speculative and even very doubtful. It is doubtful whether any oil at all will be found in the areas considered, and if any oil is found, it is still a question how much will be produced. Testing such areas, however, may add enormously to Japan's "proved" and "probable" oil-bearing ground and to the estimate of her reserves.

David White, in 1923, on the basis of a study of published descriptions and maps, estimated the oil recoverable by present methods in the Japanese Empire at from 1,000 to 1,400 million barrels. This estimate includes not only the "proved" areas, but the "probable" and "possible" areas as well.

The problem may be attacked from another angle. Statistical studies by Van Orstrand[2] and Richardson[3] tend to show that on an average 30 per cent of an oil field's total reserves have been withdrawn at the time that production reaches its peak. If this method of computation is applied to the present proved oil fields of Japan proper as a whole, a somewhat smaller estimate than Clements' figure is obtained. In 1916, when the production of crude oil in Japan reached its peak, about 31,500,000 bbl. of petroleum had been produced. If this amount represents 30 per cent of the total oil recoverable by present known methods, the original reserves in the present "proved" ground must have been 105,000,000 bbl., of which 49,000,000 bbl. has been extracted from 1875 to 1924. The 56,000,000 bbl. remaining would permit an average yearly production of 2,333,000 bbl. for twenty-four years, or of 2,000,000 bbl. for twenty-eight years.

Estimates Indicate Production of Proved Areas Is Past Peak

It must be remembered, however, that an estimate of petroleum reserves expressed in numbers implies by no means any degree of mathematical certainty. An estimate, for instance, of 1,400 million barrels means merely that in the opinion of the estimator there is a good possibility of large production for many years. An estimate of 10 million barrels signifies merely that the estimator believes little oil is present. The figures might be raised or lowered by 20 per cent without changing their real meaning.

As the matter stands, Clements' estimates and those worked out on the basis of Van Orstrand and Richardson's studies agree that the period of best production of proved areas in Japan is past, and that only a limited life of productivity lies before them. On the other hand, both Clements' and White's total estimates agree that Japan contains many areas that should be thoroughly tested by the drill before being rejected as unproductive, and that Japan has good prospects for continued production from these areas.

Production of Crude Petroleum—History

Petroleum and natural asphalt have been known in Japan for more than twelve and a half centuries. In the reign of the Emperor Tenchi (667-670A.D.) "burning water" and "burning earth" were presented to the Imperial Court by some of the inhabitants of Echigo Province. As early as the beginning of the thirteenth century petroleum was produced from hand-dug wells at Kurokawa, in the Province of Echigo. In 1516 one Nishimura was granted certain rights over oil pits at Myohoji in exchange for the payment of certain taxes; and in 1710 similar rights over oil pits at Niitsu were granted to a citizen named Magara. In the middle of the nineteenth century a physician of Echigo attempted to refine petroleum on a small scale. This led to the digging of many shallow wells.

In 1871 the first oil company was organized in Japan and trial wells under the management of American drillers were drilled in the Provinces of Shinano and Echigo but all were unsuccessful. Following this effort, numerous pits and wells were dug by hand in various places to depths as great as 600 ft. The earliest published records of production date from 1874, when 3,499 bbl. was produced.

During the years 1876-1880 the oil lands of Japan were surveyed geologically for the government under the direction of Benjamin Smith Lyman, an American geologist. Elaborate geologic maps of the oil fields of Echigo and Shinano were prepared, and several test wells were drilled.

[1]Published by permission of the Director of the U. S. Geological Survey. The first installment of this article was published in the Aug. 29 issue of the *Mining Journal-Press*. The third and final installment will appear in the next issue.

[2]Van Orstrand, C. E., "On the Empirical Representation of Certain Production Curves," *Journal*, Washington Academy of Science, vol. 15, p. 19, Washington, 1925.

[3]Richardson, G. B., "Ratio of Peak Production to Estimated Total Production in Certain Oilfields," Production of Petroleum in 1924, pub. No. 1447, Am. Inst. Min. & Met. Engrs., issued with *Mining & Metallurgy*, New York, April, 1925.

The production from hand-dug wells slowly increased until it reached 30,651 bbl. in 1880, when it began to decline, and dropped to 7,063 bbl. in 1884, and again began to grow. Several refineries were erected.

Commercial Development Began in 1891

The petroleum industry, however, was not developed on a commercial basis until 1891, when the Nippon Oil Co. was organized and opened a flowing well at Amaze, Echigo Province, by the American system of drilling. This discovery showed the decided advantages of the new system of drilling over the old and tedious method of hand-boring and stimulated the development of the industry. By 1891 the annual production had reached 63,490 bbl. In the years immediately following, the result of the successful use of American drill machinery and methods made itself felt in a steady and rapidly increasing growth in production until by 1901 this amounted to over 1,000,000 bbl.

Three years after the opening of the Amaze oil field, productive oil deposits were found at Higashiyama, Echigo Province, where there were many hand-dug wells. Early in 1898 the Nishiyama oil field was discovered, and in 1900 and 1902 the Kubiki and Ojiya oil fields were opened in the same province. In 1900 the International Oil Co., a subsidiary of the Standard Oil Company of New Jersey, interested itself in the oil industry in Japan and drilled a number of wells, principally in Hokushu, but on the whole with disappointing results.

Geological Studies Continued in 1899

Toward the end of 1899 the Japan Government began another geological study of the oil fields under the direction of the Imperial Geological Survey.

Production of crude oil in 1902 had reached 1,212,560 bbl. By 1909 it had reached 1,863,174 bbl. In 1908 the rotary system of drilling was applied at the Nishiyama oil field, Echigo Province. This marked an epoch in the oil industry of Japan. Production, however, fell off until 1912, when the introduction of rotary drills and the drilling of deeper wells began to have their effect. The production rapidly increased until it reached its peak in 1916 at 2,942,722 bbl.

During this period many oil fields were rapidly and successfully developed in the Provinces of Echigo and Akita. From the opening of the first gusher at Kurokawa in 1914 the development of the Akita oil fields was so rapid that their production soon became nearly equal to that of the Echigo oil fields, which were older and very much larger.

Production Admittedly Declining

The decline in Japanese oil production that was manifested in 1917 and 1918 was at first explained by the lack of drilling equipment, which could not be imported from the United States because of lack of shipping and of war conditions in general. Even after the armistice, when shipping became more abundant, the output of crude oil continued to decrease. The production in 1923 was little more than that of 1911. The decline in Japanese crude oil production is no longer explained away, but admitted.

The table at the top of the next column shows the production of crude petroleum in Japan proper from 1875 to 1923, and for convenience the production of Taiwan (Formosa) from 1900 to 1923.

Crude Petroleum Produced in the Japanese Empire, 1874-1924[a]

In Barrels of 42 U. S. Gal.

	Japan	Taiwan	Total		Japan	Taiwan	Total
1874	3,499	.....	3,499	1900	870,548	34	870,582
1875	5,489	.....	5,489	1901	1,116,482	41	1,116,523
1876	9,267	.....	9,267	1902	1,212,560	.....	1,212,560
1877	12,628	.....	12,628	1903	1,216,628	.....	1,216,628
1878	21,500	.....	21,500	1904	1,407,961	798	1,408,759
1879	28,199	.....	28,199	1905	1,484,976	3,551	1,488,527
1880	30,651	.....	30,651	1906	1,564,480	4,987	1,569,467
1881	20,138	.....	20,138	1907	1,718,383	6,841	1,725,224
1882	23,311	.....	23,311	1908	1,863,174	7,445	1,870,619
1883	24,613	.....	24,613	1909	1,880,736	6,429	1,887,165
1884	7,063	.....	7,063	1910	1,825,098	3,642	1,828,740
1885	8,324	.....	8,324	1911	1,736,088	1,637	1,737,725
1886	15,326	.....	15,326	1912	1,655,159	3,450	1,656,609
1887	10,034	.....	10,034	1913	1,922,216	18,084	1,940,300
1888	45,006	.....	45,006	1914	2,618,939	17,294	2,636,233
1889	63,490	.....	63,490	1915	2,915,087	18,948	2,934,035
1890	61,817	.....	61,817	1916	2,942,722	19,950	2,962,672
1891	63,618	.....	63,618	1917	2,847,650	13,765	2,861,415
1892	82,833	.....	82,833	1918	2,431,839	9,263	2,441,102
1893	106,983	.....	106,983	1919	2,228,642	9,327	2,237,969
1894	172,711	.....	172,711	1920	2,213,445	7,686	2,221,131
1895	169,873	.....	169,873	1921	2,225,812	7,518	2,233,330
1896	236,819	.....	236,819	1922	2,041,974	13,065	2,055,039
1897	262,751	.....	262,751	1923	1,784,161	15,912	1,800,073
1898	318,605	.....	318,605	1924	1,947,372[b]	22,717[b]	1,970,089
1899	538,388	.....	538,388	....	.....	.....	.....

[a] "Mining in Japan, Past and Present," Bureau of Mines, Tokyo, 1909; Iki. Tsunenaka, "Preliminary Note on the Geology of the Echigo Oil Field," Mem, Imp. Geol. Surv. Japan, No. 2, Tokyo, 1910; "Resume Statistique de l'Empire du Japan," Statistical Reports, Dept. Agriculture and Commerce.
[b] Unofficial.

Bulk of Production From Echigo District

Nearly four-fifths of all the crude oil produced in Japan from 1875 to 1923 came from the Echigo district, chiefly from the Prefecture of Niigata. In the earlier days of Japanese oil production practically all the Japanese oil was produced in Echigo; and as late as 1913 Echigo produced 95 per cent of the Japanese total. But after the Kurokawa gusher was opened in May, 1914, the Akita district came rapidly to the fore and in 1921 surpassed the Echigo district in output. In 1922 the Echigo district is estimated to have furnished 45.5 per cent of the total production and the Akita district 44 per cent.

Today practically 99 per cent of all the oil produced in Japan comes from the Echigo and Akita districts. Of a total daily production in Japan of about 4,900 bbl., the Totomi and Hokushu districts produce less than 100 bbl. and are practically negligible from the point of view of present production.

The table leading page 371 shows the production of crude oil in Japan by fields for 1913 and for 1918-1923. The information is by no means complete, as only those fields that produce more than 5,000 koku (5,675 bbl.) annually are included.

At the end of 1912, of the 2,740 producing wells in Japan of all types, machine-drilled and hand-dug, 2,153 had been drilled with American standard rigs. In March, 1917, there were 2,840 producing wells in Echigo district alone, of which 2,236 had been drilled with American standard or rotary rigs. According to the Nagaoka Chamber of Mines, there were 2,983 producing wells in Echigo district at the end of 1919. Of this number 2,170 had been drilled by American methods; 495 by the Japanese spring-pole method; and 318 dug by hand.

Even the drilled wells in Japan are not deep, according to American standards. The deepest well so far sunk is one 4,613 ft. deep in the Nishiyama field of Echigo district. For the most part, the wells range in depth from a few hundred feet to about 2,500 ft. The average depth of all wells drilled in Japan is about 1,200 ft. The shallow wells are as a rule very small producers now.

Crude Petroleum Produced in Japan, 1913, 1918-1923[a] by Principal Fields

In Barrels of 42 U. S. Gal.

	1913	1918	1919	1920	1921	1922	1923
Hokushu							
Ishikari		6,036	5,752	5,790	5,096	(b)	13,428
Akita							
Kurokawa	45,305	563,974	420,465	372,652	316,788	245,496	242,797
Chugwai-Toyokawa		213,580	269,816	316,338	381,448	402,958	308,746
Kokura-Toyokawa		103,234	107,293	82,316	47,228	19,623	24,136
Urayama		29,180	21,766	11,027	9,599	.....	.....
Urayama-Tsukigi		.....	.....	17,856	65,570	.....	.....
Tsukigi		15,620	11,972	15,369	8,431	.....	.....
Michikawa		12,366	59,527	139,299	154,416	98,242	115,758
Asahikawa	27,723	8,607	7,703	7,797	9,894	.....	15,710
Iwase		.....	.....	.....	15,389	.....	15,939
Katsurane (Yuri)		.....	9,943	35,550	56,489	102,531	124,724
Hanegawa		.....	.....	5,804	14,442	.....	15,236
Katte		.....	.....	.....	6,148	.....	.....
Echigo							
Ziitsu	593,214	517,115	466,200	498,338	484,008	505,090	396,437
Kanatsu		132,078	114,783	110,328	114,939	.....	95,282
Asahi		84,711	77,182	.....	.....	.....	.....
Higashiyama	221,846	136,741	87,602	121,376	113,971	120,472	100,181
Urase		21,761	20,806	20,563	20,139	.....	.....
Omo		20,948	27,054	.....	.....	26,083	.....
Nanokaichi	45,015	8,156	7,729	15,532	22,005	39,878	13,760
Nishiyama	698,232	477,593	398,839	321,582	262,713	227,175	188,138
Maki (Kubiki)	36,195	24,807	23,270	20,330	17,608	16,555	13,931
Torigoye		.....	5,995	15,266	15,849	.....	11,482
Daimen		.....	.....	31,908	26,834	.....	.....
Kamiiwai		.....	.....	7,040	9,326	.....	.....
Betsuyama		.....	.....	.....	.....	.....	5,657
Ojiya	2,764	.....	.....	.....	.....	.....	.....
Amaze	2,499	.....	.....	.....	.....	.....	.....

(a) "Mining Industry of Japan." b No data.

The average production per well throughout Japan is small. The largest gusher of which there is record, Kurokawa No. 5, completed in May, 1914, yielded 11,350 bbl. per day at first, but in five months it was necessary to pump the oil from it. Other flowing wells, yielding 2,000 to 4,000 bbl. daily, were completed in the Kurokawa field, but were equally short-lived.

In 1917, the average daily production of the Nishiyama field, the most productive one in Japan, was 4½ bbl. per day, and the average for the entire Echigo district, including the Nishiyama field, was only 2.25 bbl. per day.

In 1919, the average daily production of Japan amounted to 5,020 bbl. The yield of the drilled wells averaged 1.6 bbl. per day, compared with 4 bbl. a day for wells in the United States in that year. Many shallow wells which averaged only 0.1 bbl. of oil per day could then be profitably operated because of the low cost of labor and the high price of oil.

Commercial Control in Japanese Hands

The production of crude oil in Japan is entirely in the hands of native companies. By the Mining Law of 1905, only Japanese subjects or concerns incorporated under Japanese law are entitled to acquire mining rights.

In 1900 the International Oil Co., a subsidiary of the Standard Oil Co. of New Jersey, began the production and refining of oil in Japan. After operating for seven years, the company sold its interests to the Nippon Oil Co.

Practically 90 per cent of the Japanese crude oil production in 1923 was controlled by the Nippon Oil Co. (Nippon Sekiyu Kabushiki Kaisha), of Tokyo. This company, organized in May, 1888, in Niigata Prefecture, was only one of several producing companies and had a slow steady growth until the World War. The discovery of the Kurokawa field in 1914 and of the Toyokawa, Michikawa, and Yuri fields of the Akita district in the following years increased the Nippon company's process production by half. In December, 1919, it absorbed the Chuo Oil Co. (Chuo Sekiyu Kabushiki Kaisha), and in October, 1921, its chief rival, the Hoden Oil Co. (Hoden Sekiyu Kabushiki Kaisha). Its capital was increased in 1921 to 80,000,000 yen ($40,000,000) of which 50,000,000 yen ($25,000,000) is paid up.

At no time has the Japanese oil production been fully adequate to meet the demands of the refineries. The earliest recorded importation of crude oil began in 1908, when 282,276 bbl. of crude oil was imported, chiefly from the United States. In 1909 the Rising Sun Petroleum Co., a subsidiary of the Asiatic Petroleum Co. (Royal Dutch-Shell group), built a refinery at Saitosaki (Satozako) and began to refine crude oil imported from the East Indies.

In 1910 the imports of crude oil were equal to 14 per cent of the domestic production. After 1914, with the discovery of new fields in the Akita district and the rapid rise in domestic production, Japan for a time bade fair to be independent of foreign crude oil. Imports of crude petroleum decreased, until in 1918 they amounted to only 1¼ per cent of the total production.

At the close of the war, however, when it became apparent that the decrease in the Japanese production of petroleum was more than a temporary fluctuation, Japan resorted once more to increasingly large imports of crude oil. In 1923, when low prices prevailed in the United States and the Dutch East Indies, Japan imported five-eighths as much foreign crude oil as it produced.

Crude petroleum is imported chiefly from the United States and from the Dutch East Indies. In 1923, when overproduction of high-grade oil in the Los Angeles basin had cut the price of California crude oil in half, 544,265 bbl. of crude oil was shipped from the United States to Japan.

Crude Oil Produced in Japan, 1906-1923, by Companies.[a]

In Barrels of 42 U. S. Gallons

	1906	1913	1918	1919	1920	1921	1922	1923
Nippon Oil Co	373,928	624,786	1,005,086	912,604	738,490	1,962,071	1,837,000	1,585,883
Hoden Oil Co	780,186	795,641	815,512	738,490	1,203,482	.....	.....	.....
International Oil Co	78,455	.....	.....	.....	.....	.....	.....	.....
Chugwai Petroleum & Asphalt Co	.....	(b)	213,581	269,816	(b)	(b)	(b)	(b)
Nagano Kogyo Co	.....	(b)	132,078	(b)	117,368	124,265	(b)	109,421
Tsunekichi Kokura	.....	(b)	103,234	107,293	82,202	62,618	(b)	15,939
Other companies	331,911	501,789	162,348	200,439	71,903	76,858	204,974	72,918
Total Japan	1,564,480	1,922,216	2,431,839	2,228,642	2,213,445	2,225,812	2,041,974	1,784,161

(a) "Mining Industry of Japan," Bureau of Mines, Department of Agriculture and Commerce, Tokyo. (b) Not separately stated.

Crude Petroleum Imported into Japan, 1910-1923[a]

In Barrels of 42 U. S. Gallons

	From United States	From Dutch East Indies	From Other Sources	Total Imports
1910	.....	75,557	181,985	257,542
1911	.....	.....	235,261	235,261
1912	480	.....	79,323	79,803
1913	55,585	.....	28,217	83,802
1914	48,878	352	10,178	59,408
1915	113,469	.....	.....	113,469
1916	65,224	.....	.....	65,224
1917	77,211	.....	.....	77,211
1918	26,858	3,405	2	30,265
1919	32,953	26,834	10	59,797
1920	26,338	72,652	.....	98,990
1921	5,688	261,100	714	267,482
1922	(b)	(b)	(b)	563,464
1923	(b)	(b)	(b)	1,123,357

(a) Annual and Monthly Returns of the Foreign Trade of the Empire of Japan. (b) No data.

The foregoing figures do not, however, include crude petroleum imported for the use of the Japanese Navy.

These imports are not included in the published statistics of the foreign trade of the Empire, and no statement of their amount is ever given out. According to the "Japan Year Book for 1923," "the navy gets the bulk of the heavy oil imported from Borneo and California."

In 1922 the navy was reported to have contracted with the Asahi Petroleum Co. for 400,000 tons (2,800,000 bbl.) of crude oil for fuel purposes and with the Mitsui Bussan Kaisha for 100,000 tons (700,000 bbl.) additional. Most of the oil was to be imported from California.

Before the World War Japan consumed annually about 2,000,000 bbl. of crude oil. Of this amount domestic production supplied 91.58 per cent and importation the remainder. During the war period, when domestic production was at its peak, imports were negligible. Since 1919, however, imports have supplied 16.8 per cent of the requirements of the Japanese refineries. In 1923, 38.6 per cent of the crude oil consumed in Japan was imported. This was due in part to the low price of crude oil prevailing in California and in the East Indies, which made it cheaper to import crude than to produce it in Japan.

Indicated Consumption, Refining, and Stocks of Crude Oil in Japan, 1910-1923.

In Barrels of 42 U. S. Gallons

	Crude Petroleum Produced in Japan (*a*)	Crude Petroleum Imported Into Japan (*b*)	Crude Petroleum Available for Distillation	Refined Products Produced (*a*)	Indicated Stocks of Crude Oil
1910	1,825,098	257,542	2,082,640	1,224,335	858,305
1911	1,736,088	235,261	1,971,349	1,168,821	802,528
1912	1,655,159	79,803	1,734,962	1,260,885	474,077
1913	1,922,216	83,802	2,006,018	1,414,280	591,738
1914	2,618,939	59,408	2,678,347	1,871,475	806,878
1915	2,915,087	113,469	3,028,556	2,441,379	587,177
1916	2,942,722	65,224	3,007,946	2,412,681	595,265
1917	2,847,650	77,211	2,924,861	2,434,269	490,532
1918	2,431,839	30,265	2,462,104	2,390,013	72,091
1919	2,228,642	59,797	2,288,439	2,007,765	280,674
1920	2,213,445	98,990	2,312,435	1,989,613	322,822
1921	2,225,812	267,482	2,493,294	1,980,842	512,452
1922	2,041,974	563,464	2,605,438	2,110,889	494,549
1923	1,784,161	1,123,357	2,907,518	1,950,000	957,518

(*a*) Statistical Reports of the Department of Agriculture and Commerce, Tokyo.
(*b*) Annual and Monthly Returns of the Foreign Trade of the Empire of Japan.

The figures of indicated stocks in the foregoing table, derived by subtracting the total quantity of refined products produced from the total crude oil available for distillation, may seem unnecessarily large. They include, however, quantities of crude turned over to the Navy Department for its use, for which no official statistics are published. The amount utilized by the Navy was estimated[3] at 100,000 tons (673,500 bbl.) in 1923; this amount was expected to be doubled "in the near future."

The refining of petroleum in Japan has kept pace with the production of crude and has followed its ups and downs. Before the World War, the Japanese refineries produced 1,267,000 bbl. a year of refined oils, greases, waxes, and bitumens. The output of refined products reached its peak of 2,400,000 bbl. yearly at about the same time that the production of crude oil reached its highest point. Since 1919, however, only 2,008,000 bbl. of refined petroleum products have been prepared annually in the Japanese refineries.

Most of the Japanese refineries are situated in the main fields of the Akita and Echigo districts. The oil is pumped through short pipe lines from the fields to the refineries, or shipped in tank cars.

The refineries are equipped with modern apparatus and follow fairly closely the methods of distillation employed in the United States. "Cracking" processes have been recently adopted. The refineries produce gasoline, kerosene, solar,[4] neutral or gas oil (keiyu), fuel oil, lubricating oils, paraffine, and tar and pitch. From 24,000,000 to 30,000,000 lb. of candles are also made annually.

The Japanese refineries have a total daily capacity of 13,000 bbl. of crude. The following table, taken from Coumbe, shows the ownership, location, daily capacity, and products produced by the larger refineries of Japan:

Principal Petroleum Refineries in Japan

Companies	Location	Daily Capacity, Barrels	Products (*a*)	Remarks
Nippon Oil Co.	Naoetsu, Niigata	500	1,2,3,4,7	.....
Nippon Oil Co.	Kashiwazaki, Niigata	2,500	1,2,3,4,8,9	2 plants
Nippon Oil Co.	Nuttari, Niigata	2,000	1,2,3,4	.....
Nippon Oil Co.	Akita, Akita	3,000	2,3,4,5,10	3 plants
Asahi Oil Co.	Tokyo (*b*)	500	1,2,3,4	.....
Asahi Oil Co.	Saitosaki, Kyushu	1,000	1,2,4,6	Refines imported crude petroleum
Toikoku Oil Co.	Niitsu, Niigata	1,500	1,2,4,5	
Toikoku Oil Co.	Tokuyama, Suwo	1,000	1,6	
Ogura and Co.	Okubo, Akita	500	5,10	
Ogura and Co.	Oshima (Tokyo) *b*	500	1,2,3,4	
Mikado Oil Co.	Kobe	125	3,4,11	

(*a*) 1, Gasoline; 2, kerosene; 3, lubricating oil; 4, gas oil; 5, tops; 6, fuel oil 7, paraffine wax; 8, wax distillate; 9, grease; 10, asphalt; 11, petroleum coke.
(*b*) The refineries in the neighborhood of Tokyo were totally or partly destroyed in the earthquake of Sept. 1, 1923. Recent reports mention that these plants are being rebuilt.

In addition to the foregoing, there are numerous small refineries, most of which are situated in and around the fields in Akita and Niigata prefectures. There are also small refineries near Kobe and Osaka, near Sagara, Prefecture of Shizuoka, and the Island of Hokushu. They produce chiefly kerosene and solar oil.

Before the World War, gasoline, benzine, and the lighter products constituted only 0.76 per cent; kerosene 39.7 per cent; solar or gas oil, 20.6 per cent; lubricating oil, 12.9 per cent; and fuel oil, 25.4 per cent of the products distilled from the crude. Automobiles in

[3] "The Japan Year Book, 1923," p. 545, Tokyo, 1923.

[4] Solar oil is a petroleum distillate, one cut below kerosene. It is marketed in Japan as "light oil" or "keiyu," for use as fuel for motor boats and stationary engines. It is also known as neutral or gas oil in this market.

Output of Petroleum Products From Refineries of Japan[a]

In Barrels of 42 U. S. Gallons

	Gasoline	Kerosene	Solar Oil	Lubricating Oil	Heavy Oil (*b*)	Paraffine	Pitch	Asphalt	Waxes	Total
1910	5,496	460,211	238,930	128,618	381,390	18	9,672	.....	.....	1,224,335
1911	2,478	446,685	250,614	140,065	318,741	.....	10,238	.....	.....	1,168,821
1912	5,317	487,382	267,096	182,299	310,472	.....	8,319	.....	.....	1,260,885
1913	24,990	616,104	286,431	202,790	277,983	485	5,497	.....	.....	1,414,280
1914	41,432	657,949	445,648	267,784	453,371	729	3,753	809	.....	1,871,475
1915	53,490	601,174	605,108	297,737	840,583	1,119	47,032	1,136	.....	2,447,379
1916	8,710	602,846	504,378	266,933	894,450	1,683	129,225	4,456	.....	2,412,681
1917	142,229	517,299	698,038	401,311	623,390	4,282	37,577	10,143	.....	2,434,269
1918	166,954	349,921	809,817	393,554	453,278	3,206	200,212	13,071	.....	2,390,013
1919	167,697	277,046	658,799	416,383	225,703	10,892	213,338	30,907	.....	2,000,765
1920	178,709	226,842	648,282	419,656	210,153	1,347	269,656	33,454	1,514	1,989,613
1921	160,356	162,608	793,026	484,589	118,409	872	225,831	33,836	1,315	1,980,842
1922	164,985	180,751	830,864	371,730	187,770	.....	372,803	1,441	545	2,110,889
1923	202,385 (*c*)	175,146 (*c*)	680,014 (*c*)	384,770 (*c*)	206,195 (*c*)	(*d*)	(*d*)	(*d*)	(*d*)	1,950,000 (*e*)

(*a*) Statistical reports of the Department of Agriculture and Commerce, Tokyo. (*b*) Fuel oil and residuum. (*c*) Estimate by Nippon Oil Co. (*d*) No data. (*e*) Estimated.

Japan were few; and kerosene was largely used for lighting.

Since 1919, however, gasoline and the lighter oils have represented 8.8 per cent of the total output; kerosene has represented 12.7 per cent; gas oil, 45 per cent; lubricating oil, 30.8 per cent, and fuel oil 11.8 per cent. Both the growth in the manufacturing industries and the higher standard of comfort in living during the last decade are reflected in the increased output of gasoline, gas oil, and lubricating oil, and in the decreased output of kerosene and fuel oil.

In the last few years the declining production of crude oil in Japan and the higher cost of the crude produced has made it difficult for the refineries operating on domestic crude to compete with the cheaper imported refined oils. Consequently, increased amounts of foreign crude have been imported, and refined in the Saitosaki and Tokuyama refineries. A new refinery has been built by the Nippon Oil Co. at Tsurumi, near Yokahama, refined crude oil has been imported from California, and it is reported that some at least of the Nippon company's refineries in the Echigo and Akita districts will be closed down.

Japan consumes annually from, say, 3,000,000 to 3,500,000 bbl. of refined mineral oils, greases, waxes, and bitumens. Before the World War the average yearly consumption of refined products was 2,990,000 bbl., of which the Japanese refineries supplied 57.8 per cent and importation the remainder. In 1916 and 1917 the Japanese papers took considerable pride in the fact that the domestic refineries were supplying 80 per cent of the total consumption. Since 1919, the average annual consumption has been 3,284,000 bbl., of which 60.4 per cent was furnished by the domestic refineries.

These figures, however, refer only to consumption by the civilian population and industries of Japan. No statistics of the consumption by the navy or the army are ever given out. The Japan Year Book, 1923, estimates the annual civilian consumption at 2,600,000 *koku* (2,951,000 bbl.) and the entire consumption of mineral oils in Japan, including petroleum products consumed by the navy, at 5,000,000 *koku*, or 5,675,000 bbl.

Two-fifths of Japan's civilian consumption of petroleum products is supplied by importation. Before the World War, Japan bought each year from other countries 1,635,000 bbl. of refined oils, greases, waxes and bitumens. These imports decreased during the war period to as low as 648,879 bbl. in 1917. After 1919, when the decrease in the output of the Japanese refineries began to be manifest, imports of refined petroleum products rapidly increased. Since the war they have averaged 1,316,000 bbl. a year.

Indicated Consumption of Petroleum Products in Japan, 1910-1923

In Barrels of 42 U. S. Gallons

	Petroleum Products Produced in Japanese Refineries (*a*)	Petroleum Products Imported Into Japan (*b*)	Petroleum Products Exported From Japan (*b*)	Indicated Consumption (*c*)
1910	1,224,335	1,783,955	7,009 (*d*)	3,001,281
1911	1,168,821	1,743,345	9,861 (*d*)	2,902,305
1912	1,260,885	1,582,600	10,075 (*d*)	2,833,410
1913	1,414,280	1,431,643	22,815 (*d*)	2,823,108
1914	1,871,475	1,036,266	11,003	2,896,738
1915	2,447,379	1,001,761	27,264	3,421,876
1916	2,412,681	763,873	166,124	3,010,430
1917	2,434,269	648,879	135,739	2,947,409
1918	2,390,013	885,304	88,252	3,187,065
1919	2,000,765	1,179,291	87,050	3,093,006
1920	1,989,613	1,279,717	40,169	3,229,161
1921	1,980,842	1,043,338	25,384	2,998,796
1922	2,110,889	1,529,785	25,367	3,615,307
1923	1,950,000 (*e*)	1,550,182	18,280	3,481,902

(*a*) Statistical Reports of the Department of Agriculture and Commerce, Tokyo. (*b*) Annual and Monthly Returns of the Foreign Trade of the Empire of Japan. (*c*) Domestic production plus imports less exports. (*d*) Shipments to China, from Chinese maritime customs statistics. (*e*) Estimated.

Even more striking than the changes in the total imports of refined petroleum products during and since the war period is the change in the character of the imports. From 1910 to 1913, gasoline, benzine, and the more volatile oils formed only 1.74 per cent of the total imports; kerosene formed 88.2 per cent; gas oil ("other illuminating oils"), 1.73 per cent; lubricating oil ("other mineral oils"), 3.5 per cent; and paraffine wax, 4.6 per cent. Since 1919, gasoline has constituted 14.2 per cent of the total; kerosene, 59.1 per cent; gas oil, 5.9 per cent; lubricating oil, 9.3 per cent; and paraffine wax, 9 per cent.

These changes are similar to those which have taken place in the output of manufactured products from the refineries, and are due to more than one circumstance. More gasoline is imported both because the consumption of gasoline has increased, and because the Japanese crude oils are relatively poor in the lighter fractions. Less kerosene is imported because less kerosene is consumed in Japan nowadays. The imports of gas oil and lubricating oils have increased because the general growth of Japanese manufacturing has increased the consumption of these oils. Their relative increase in imports has been less than that of gasoline, however, because the Japanese refineries can supply more of these oils from the heavy native crude oils.

Properly speaking, Japan has no exportable surplus of mineral oils. Accordingly, exports of mineral oils from Japan have at no time been important. They were not separately stated in Japanese statistics until 1914.

Practically all the mineral oil exported from Japan is shipped to China or to the Kwantung leased province, from which it is distributed throughout Manchuria. Small shipments of refined mineral oils, not counted in the Japanese exports statistics, are also shippped to Cho-

Refined Oil Imported Into Japan[a]

In Barrels of 2 U. S. Gallons

	Benzine	Kerosene in Tins	Other Kerosene	Mineral Colza	Other Illuminating Oil	Other Mineral Oils (*b*)	Paraffine Melting Below 45 Deg. C. (*c*)	Other Paraffine (*d*)	Pitch and Asphalt (*e*)	Vaseline (*f*)
1910	15,282	748,596	893,536	12,080	6,598	47,872	15,392	41,680	1,284	1,635
1911	37,991	685,476	830,442	11,253	11,425	48,776	17,483	97,693	522	2,284
1912	53,454	491,057	861,616	16,130	15,830	71,639	26,465	40,211	3,845	2,353
1913	7,049	464,731	793,423	13,463	26,573	62,153	28,779	29,961	2,465	3,046
1914	42,524	325,561	518,553	2,891	18,215	59,699	26,066	38,176	2,759	1,822
1915	25,646	390,478	427,622	9,433	19,661	58,722	11,300	55,374	1,573	1,952
1916	16,750	229,724	300,615	6,344	3 ,890	65,415	47,554	58,086	4,059	3,436
1917	27,137	185,016	277,536	12,795	14,999	50,073	16,119	59,507	3,388	2,309
1918	65,663	230,180	324,042	6,935	35,216	107,296	33,841	75,592	4,610	1,929
1919	63,413	205,482	684,037	5,008	36,943	73,901	20,497	81,234	5,974	2,802
1920	145,384	200,744	606,686	13,124	67,856	112,030	2o,122	88,915	15,067	3,789
1921	138,431	247,271	397,317	2,905	38,691	82,984	29,440	80,102	20,394	5,803
1922	281,821	293,673	507,772	4,191	134,955	106,400	38,479	93,852	63,978	4,664
1923	305,819	325,055	419,363	6,043	75,574	238,300	23,945	108,213	43,750	4,120

(*a*) Annual and Monthly Returns of the Foreign Trade of the Empire of Japan. (*b*) Converted from amount of weight (kin) at an assumed average specific gravity of 0.900. (*c*) Converted from amount of weight (kin) at an assumed average specific gravity of 0.820. (*d*) Converted from amount of weight (kin) at an assumed average specific gravity of 0.920. (*e*) Converted from amount of weight (kin) at an assumed average specific gravity of 1.222. (*f*) Converted from amount of weight (kin) at an assumed average specific gravity of 0.854.

Mineral Oils Exported From Japan, 1914-1923[a]

In Barrels of 42 U. S. Gallons

	Kerosene	All Other Mineral Oils (*b*)	Total
1914	(*c*)	11,003 (*d*)	11,003
1915	(*c*)	27,264 (*d*)	27,264
1916	(*c*)	166,124 (*d*)	166,124
1917	86,674	49,065	135,739
1918	39,426	48,826	88,252
1919	17,412	69,638	87,050
1920	8,788	31,381	40,169
1921	1,643	23,741	25,384
1922	3,163	22,204	25,367
1923	961	17,319	18,280

(*a*) Annual and Monthly Returns of the Foreign Trade of the Empire of Japan. (*b*) Conversions based on an assumed specific gravity of 0.850, as Chinese statistics show that illuminating oils predominate. (*c*) Not separately stated. (*d*) Includes gasoline and kerosene.

sen (Korea), Taiwan (Formosa), and Karafuto (Japanese Sakhalin).

More detailed information on the Japanese exports of mineral oils may be gained from the Chinese import statistics. These show that kerosene and lubricating oil predominate in the Japanese exports of mineral oils.

The consumption of gasoline, benzine, and the lighter petroleum oils has increased more than tenfold over the

Mineral Oil Imported into China from Japan, 1910-1923[a]

In Barrels of 42 U. S. Gallons

	Gasoline, Benzine, Naphtha and Petrol	Kerosene	Engine and Lubricating Oil	Fuel Oil	Total
1910	502	729	5,778	...	7,009
1911	250	508	9,103	...	9,861
1912	555	4,490	5,030	...	10,075
1913	525	17,370	4,920	...	22,815
1914	727	27,720	9,750	...	38,187
1915	1,284	230,194	14,590	14	246,082
1916	4,025	142,276	23,059	154	41,514
1917	6,881	139,920	23,952	...	170,753
1918	8,945	52,883	23,813	210	85,851
1919	10,874	30,402	26,733	217	68,226
1920	18,286	21,481	35,239	...	75,366
1921	8,288	18,366	15,348	21	42,023
1922	4,727	11,384	19,537	42	35,690
1923	7,101	29,227	18,140	...	54,468

(*a*) Chinese Maritime Customs Statistics.

amount consumed before the World War. From 1910 to 1913, an average of 37,750 bbl. of gasoline was consumed yearly in Japan. From 1920 to 1923, however, 388,500 bbl. was annually consumed.

Of the 37,750 bbl. of gasoline consumed annually in the years which immediately preceded the World War, the Japanese refineries furnished 24.5 per cent; 19.21 per cent was imported from the United States; and 56.29 per cent was imported from the Dutch East Indies.

From 1920 to 1923 the figures available show that the Japanese refineries furnished 46.57 per cent of the gasoline used in Japan; 13.06 per cent was imported from the United States; and 40.37 per cent was imported from the Dutch East Indies.

Before the World War, the number of automobiles in Japan, according to the *Japan Gazette* of April 9, 1920, did not exceed 550; in 1924, however, they numbered more than 5,000, and at the beginning of 1925 there were registered in Japan 15,286 passenger automobiles, 6,825 motor trucks, and 7,015 motorcycles.[5]

Less than half as much kerosene is consumed in Japan as in the years preceding the World War. From an average of 1,911,000 bbl. from 1910 to 1913, the consumption of kerosene dropped to an average of 934,000 bbl. from 1920 to 1923. This decrease may be ascribed to the greater use of electric and other improved methods of lighting.

In the period from 1910 to 1914, the Japanese refineries supplied 25.5 per cent of the kerosene required in Japan proper; 49.55 per cent was imported from the United States; and 22.14 per cent was imported from the Dutch East Indies. From 1920 to 1923, the

[5]Commerce Reports, 1925, No. 5, p. 253, Washington, Feb. 2, 1925.

Indicated Consumption of Gasoline in the Japanese Empire, 1910-1923

In Barrels of 42 U. S. Gallons

	Produced in Domestic Refineries (*a*)	Imported From United States (*b*)	Imported From Dutch East Indies (*b*)	Imported From Other Countries (*b*)	Exported (*c*)	Indicated Consumption (*d*)
1910	5,496	4,968	10,840	13	419	20,891
1911	2,478	7,445	30,541	5	208	40,269
1912	5,317	10,066	43,377	11	462	58,304
1913	24,990	7,033	.....	16	525	31,519
1914	41,432	11,809	30,706	9	727	83,232
1915	53,490	11,858	13,788	....	1,284	77,855
1916	8,710	3,386	13,364	...	4,025	21,435
1917	142,229	9,143	8,515	9,479	6,881	162,488
1918	166,954	7,643	57,477	543	8,945	223,672
1919	167,697	20,358	40,548	2,507	10,874	220,236
1920	178,709	27,953	115,788	1,642	7,454	316,638
1921	160,356	35,429	103,002	.....	6,907	291,880
1922	164,985	(*f*)	(*f*)	(*f*)	3,939	442,867
1923	202,385 (*e*)	103,667	201,810	341	5,917	502,286

(*a*) Thirty-fifth Annual Report of the Department of Agriculture and Commerce Tokyo, 1920. (*b*) Annual and Monthly Returns of the Foreign Trade of the Empire of Japan. (*c*) Shipments to China, from Chinese Maritime Customs Statistics. (*d*) Domestic production plus imports less exports. (*e*) Estimate by the Nipppon Oil Co. (*f*) No data.

Indicated Consumption of Kerosene in Japan, 1910-1923

In Barrels of 42 U. S. Gallons

	Produced in Japanese Refineries (*a*)	Imported From United States (*b*)	Imported From Dutch East Indies (*b*)	Imported From Other Countries (*b*)	Less Exports	Indicated Consumption (*d*)
1910	460,211	1,122,436	506,838	12,858	729 (*c*)	2,101,614
1911	446,685	1,023,932	491,986	.....	508 (*c*)	1,962,095
1912	487,382	973,861	378,812	.....	4,490 (*c*)	1,835,565
1913	616,104	789,207	357,840	.....	17,370 (*c*)	1,745,781
1914	657,949	628,941	215,171	.....	27,720 (*c*)	1,474,341
1915	601,174	647,227	170,837	48	230,194 (*c*)	1,189,092
1916	602,846	472,152	58,192	.....	142,276 (*c*)	990,914
1917	517,299	427,247	35,310	.....	86,674	893,192
1918	349,921	470,319	83,668	238	39,426	864,720
1919	277,046	730,705	158,027	786	17,412	1,149,452
1920	226,842	700,681	106,740	.....	8,788	1,025,475
1921	162,608	422,008	221,481	1,119	1,643	805,573
1922	180,751	586,324	215,117	7	3,167	979,132
1923	175,146 (*e*)	532,052	148,373	63,992	961	918,602

(*a*) Statistical Reports of the Department of Agriculture and Commerce, Tokyo. (*b*) Annual and Monthly Returns of the Foreign Trade of the Empire of Japan. (*c*) Shipments to China, from Chinese Maritime Customs statistics. (*d*) Production plus imports less exports. (*e*) Estimate by the Nippon Oil Co.

Japanese refineries furnished 19.97 per cent of the kerosene consumed; 59.95 per cent was imported from the United States; and 18.52 per cent from the Dutch East Indies.

The consumption of gas oil and similar distillates has increased 187 per cent in the last decade. From 1910 to 1913 Japan consumed annually 276,000 bbl. of gas, neutral, and solar oil. Since 1919, the consumption of these oils has averaged 793,000 bbl. At no time have imports of gas and neutral oils been important. Before the World War the Japanese refineries furnished 94.5 per cent of the total consumption, and since the Armistice they have provided 91 per cent of the total consumption.

The Japanese consumption of lubricating and fuel oil has increased from a yearly average of 537,000 bbl.

Indicated Consumption of Gas Oil, Neutral Oil and Solar Oil in Japan, 1910-1923

In Barrels of 42 U. S. Gallons

	Produced in Japanese Refineries (*a*)	Imported From United States (*b*)	Imported From Dutch East Indies (*b*)	Imported From Other Countries (*b*)	Indicated Consumption
1910	238,930	.....	.....	.....	245,528
1911	250,614	.....	.....	.....	262,039
1912	267,096	.....	.....	.....	282,926
1913	286,431	21,358	.....	5,215	313,004
1914	445,648	14,857	881	2,477	463,863
1915	605,108	18,477	762	422	624,769
1916	504,378	30,810	857	223	536,268
1917	698,038	13,143	1,786	70	713,037
1918	809,817	33,239	1,714	263	845,033
1919	658,799	33,596	3,143	204	695,742
1920	648,282	.....	.....	.....	716,138
1921	793,026	.....	.....	.....	831,717
1922	830,864	.....	.....	.....	965,819
1923	680,014 (*d*)	.....	.....	.....	755,588

(*a*) Statistical reports of the Department of Agriculture and Commerce, Tokyo. (*b*) Annual and Monthly Returns of the Foreign Trade of the Empire of Japan. (*c*) Production plus imports. No data on exports available. (*d*) Estimate by Nippon Oil Co.

from 1910 to 1913, to a yearly average of 695,000 bbl. from 1919 to 1923. The percentage of the total consumption supplied by the domestic refineries was 89.35 before the World War, and 83.14 since the Armistice.

Indicated Consumption of Lubricating and Fuel Oil in Japan, 1910-1923

In Barrels of 42 U. S. Gallons

	Produced in Japanese Refineries (a)	Imported From United States (b)	Imported From Dutch East Indies (b)	Imported From Other Countries (b)	Less Exports (b)	Indicated Consumption (d)
1910	510,008	45,158	142	2,569	5,778 (c)	552,102
1911	458,806	41,130	402	7,244	9,103 (c)	498,479
1912	492,771	64,894	3,339	3,406	5,030 (c)	559,380
1913	480,773	57,564	74	4,515	4,920 (c)	538,006
1914	721,155	56,038	791	2,870	9,750 (c)	771,104
1915	1,138,320	58,401	.....	321	14,590 (c)	1,182,452
1916	1,161,383	64,991	.....	424	23,059 (c)	1,203,739
1917	1,024,701	49,958	.....	105	49,065	1,025,709
1918	846,832	107,236	.....	60	48,826	905,302
1919	642,086	73,480	174	247	69,638	646,349
1920	620,809	.....	.....	.....	31,381	710,458
1921	602,998	.....	.....	.....	23,741	662,241
1922	559,500	.....	.....	.....	22,204	643,778
1923	590,965 (e)	.....	.....	.....	17,319	811,946

(a) Statistical Reports of the Department of Agriculture and Commerce, Tokyo. (b) Annual and Monthly Returns of the Foreign Trade of the Empire of Japan. (c) Shipments to China, from Chinese Maritime Customs Statistics. (d) Domestic production plus imports less exports. (e) Estimate by Nippon Oil Co.

To be continued

Limestone Abundant in Canada

Limestone is a common rock of most countries. Marbles of exceptional character may be carried long distances for special purposes, and superior building stone is sometimes transported from Europe to North America. But few countries, if any, lack at least a domestic supply of limestone for common purposes. In Canada the places from which limestones may be obtained are too numerous to be mentioned in detail. Their general distribution is outlined as follows in a bulletin recently issued by the Canadian Pacific Railway Co.:

In the Maritime Provinces, St. John, N. B., is the center of the largest operations of the limestone industry. Both limestone of high purity and dolomitic or magnesian limestone are obtained. Limestone of the latter class also is quarried in other parts of that province. In Nova Scotia, limestone for flux is quarried extensively at River George in Cape Breton and Marble Mountain in Inverness County. In the counties of Hants, Lunenburg, and Pictou limestones occur in important quantities that are essentially 97 per cent or more carbonate of lime, with insignificant amounts of magnesia.

In Quebec and Ontario, crystalline limestone is quarried at numerous places along the southern margin of the Laurentian Plateau. Renfrew, Ontario, is one notable locality. But much the greater supply is obtained from limestones of the bedded classes. The better types of pure limestone are found in the Chazy, Trenton, and Corniferous formations; dolomites or high magnesian limestones are obtained especially from the Beekmantown, Niagara, Guelph, and Onondaga formations. All of these formations occur in the lowland along the St. Lawrence river and Great Lakes, a region that is well served by railways. Among localities where limestone of high quality is quarried are Dudswell, Phillipsburg, St. Marc, and other places near Montreal and Hull in Quebec; Ottawa, Kingston, Pointe Anne near Belleville, Renfrew, Medonte, Uhthoff, and Beachville in Ontario. More or less limestone of magnesian character is obtained at numerous places throughout the lowland of both provinces.

In Manitoba, Tyndall, Lyall, Stony Mountain, Steep Rock, and Moosehorn give an important output of lime and building stones. The product of such quarries as the Tyndall, Garson, and Lyall, known as the upper mottled limestone of Manitoba, is now recognized as one of the foremost building stones in Canada. Its use is rapidly expanding and it is now employed in quantity in the construction of superior buildings as far east as the city of Quebec. It now competes favorably in the market with any imported ornamental stone for building purposes within a wide radius. Production and transportation costs enable this stone to compete with the well-known stones from the central United States. In composition, Manitoba limestones are generally magnesian. Suitable supplies for the manufacture of cement are, however, obtained between Lake Winnipeg and Lake Manitoba, and also in the vicinity of Lake Winnipegosis.

Saskatchewan in the settled portion is largely underlain by rocks that are not lime producing. Alberta contains commercially unlimited resources in limestone, which forms a great part of the front ranges of the Rocky Mountains. Blairmore, Exshaw, Kananaskis, and the vicinity of Banff supply limestone suitable for cement making and are important producing centers. In the Banff district limestone of exceptional purity (97 to 98 per cent) is reported.

British Columbia gives an important production and has enormous resources in limestone, especially of marble. Marblehead, north of Kootenay Lake, Marble Bay, Texada Island and Nootka Sound, Vancouver Island, yield marble of high lime content. South Vancouver Island, Yale, Agassiz, Hope, Shames and other places in the vicinity of Prince Rupert contain large amounts of limestone suitable for a number of useful purposes.

Smaller 1924 Exports of Austrian Magnesite

The exportation of magnesite from Austria in 1924 amounted to only about one-third of the normal amounts shipped, according to *Commerce Reports*. Exports of crude magnesite totaled 1,633 metric tons, against 2,249 in 1923. Practically all went to Great Britain and Germany. Exports of dead-burned magnesite in 1924 amounted to 73,921 metric tons, compared with 84,782 during the preceding year.

Notwithstanding the high import duty into the United States, this country consumed 43,171 metric tons, as against 45,544 in 1923. Germany followed with a consumption of 9,862 tons, compared with 10,077 in the preceding year; France, 6,898, increasing from 6,765 tons in 1923; England, 5,159 tons, a decline from 13,057; Czechoslovakia, 2,156, a slight change from 2,183 tons; Italy, 1,326, increasing from 1,079; and Spain, 1,281, an advance from 691 tons in 1923. Shipments also went to Poland, Yugoslavia, Switzerland, Peru, India, Argentina, Chile, Mexico, and Australia.

Indian Copper Reports

The first annual report of the India Copper Corporation (the reorganized Cordoba Copper Association) indicates a considerable development. Particular attention has been given to the Masaboni Mines, at Chota Nagpur, whose reserves have been increased from 273,180 to 328,840 tons during the first four months of 1925. The copper content of the ore has also risen from 3.9 to 4.04 per cent.

Useful Operating Ideas

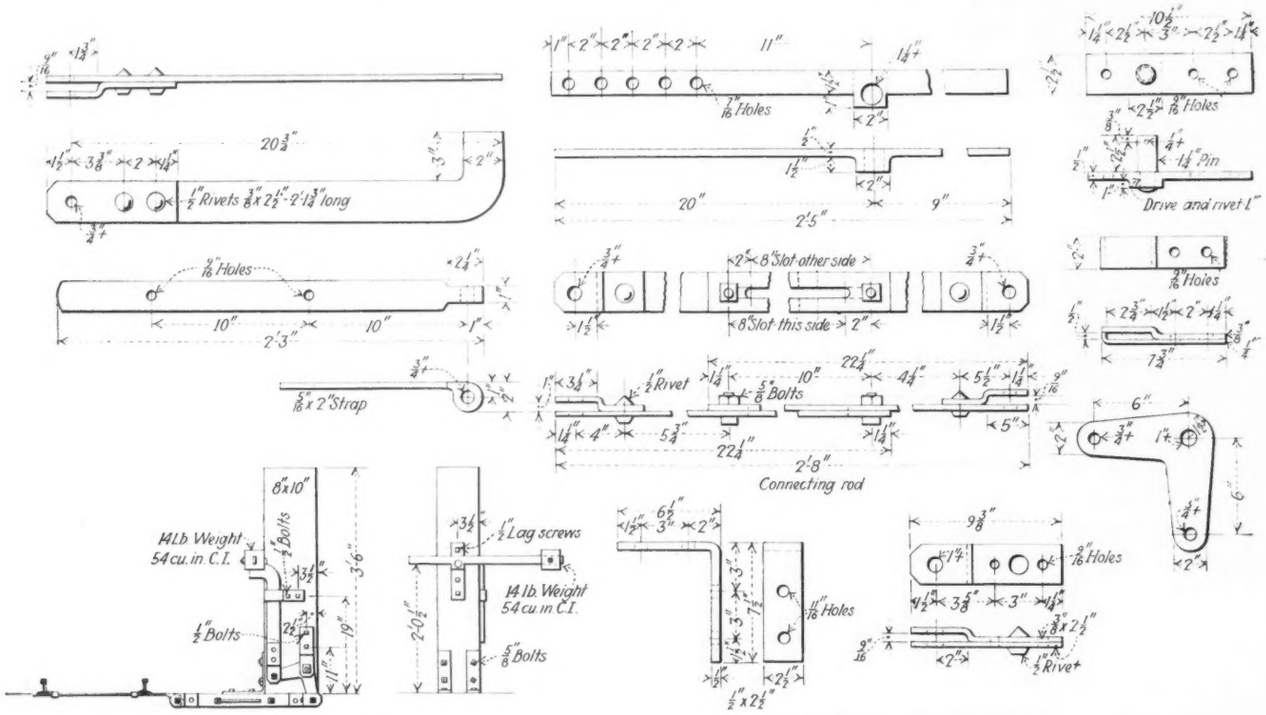
Handy Track Switch

Device Designed to Obviate Injury to the Hands in the Operation of Mines

Hand accidents in operating track switches in underground operations can be minimized by a switch-throwing device that is off the ground and at a convenient height. A handy device of this nature has been designed by the staff of the Calumet & Arizona Mining Co. and is in use at the company's mines at Bisbee, Ariz.

The switch is thrown by a weighted hand lever, which traverses an arc of 180 deg. and strikes either the top or the bottom of a vertical sliding member one end of which is attached to a bell crank. The other leg of the crank is attached to a connecting rod fastened to a strap connected to the movable track section. The whole mechanism is fastened to a timber at the side of the drift where it is out of the way and does not reduce the clearance space. All of the parts can be readily made in the mine shop. The weight attached to the throwing arm weighs 14 lb. and is made from cast iron.

Acknowledgment is made to the men of the mining staff of the Calumet & Arizona Mining Co. for the use of the blueprint from which the accompanying drawing was made.



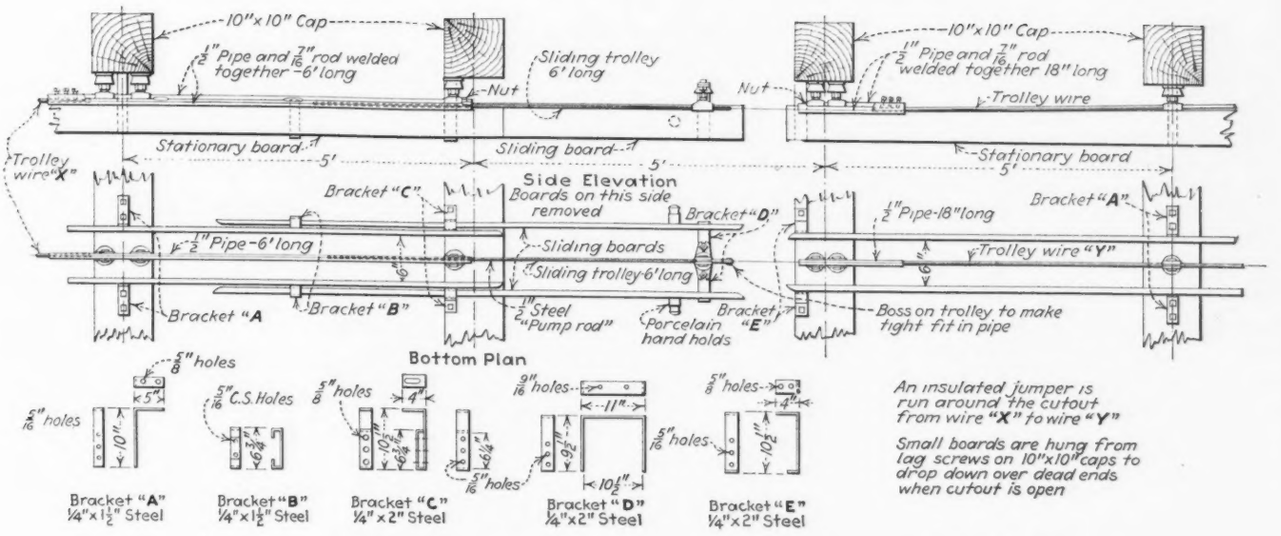
Details of switch-throwing mechanism for single-throw underground switches developed by Calumet & Arizona Mining Co.

Handling Clay in Crushers

Sticky clay interferes with the regular operation of rock crushers and entails extra labor to work the clayey material through the crusher. At cement mills the difficulty is partly overcome by sprinkling fine dry mix in the throat of the crusher before the clayey material is fed. This prevents sticking, on the same principle that prevents dough from sticking when it is coated with dry flour. Fine tailings will answer the purpose in crushing plants.

Construction Details of Trolley Cutout

The design of a safety trolley cutout in use at the mines of the Calumet & Arizona Mining Co. at Warren, Ariz., is shown in the illustration at the top of page 377. The movable portion of the trolley wire is 5 ft. long, the center to center spacing of the caps and posts. An insulated "jumper" is run around the cutout to provide continuity of current. The trolley wire is protected by side boards supported from the caps by brackets. At the cutout the trolley wire is fastened by set screws to a ½-in. pipe, 18 in. in length, which is welded to a 7/16-in. rod along its length. This is supported by the trolley hangers. The sliding trolley wire is a piece of ½-in. steel pump rod, 6 ft. in length. This enters a ½-in. pipe, 6 ft. long, which is welded to a 7/16-in. rod of corresponding length. The pipe is supported by the trolley hangers. The trolley wire is inserted in one



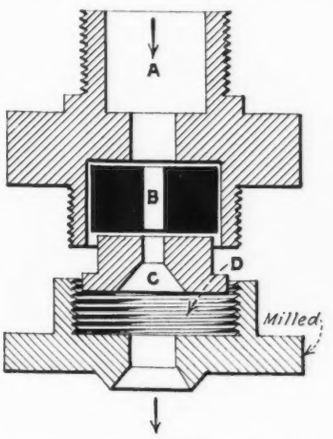
Details of safety trolley cutout used by Calumet & Arizona Mining Co. when loading ore from underground chutes

end and held by set screws. The sliding side boards are supported by brackets attached to the caps. Two porcelain hand holds are provided at the end of the movable portion for operation. Small boards are provided which are hung on by lag screws and cover the dead ends when the cutout is open.

Acknowledgment of the courtesy of the Calumet & Arizona Mining Co. in giving permission to publish the detailed design is made.

A New Type of Valve

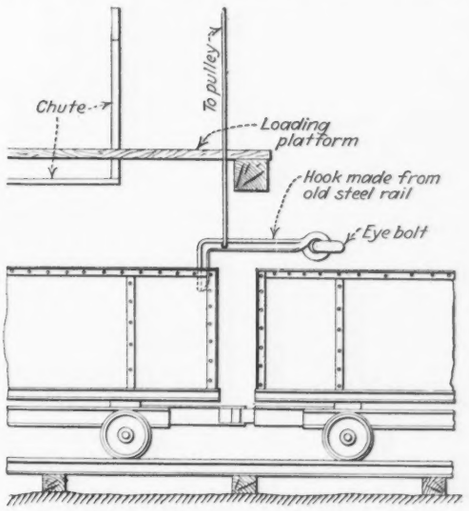
A new type of valve developed and in use at the concentrating mill of the Inspiration Consolidated Copper Co., at Miami, Ariz., is shown in the accompanying illustration. The valve is used on the lime circuit and has proved satisfactory in maintaining a uniform alkalinity in flotation work. It was invented by F. C. Devereux. The valve consists of a seat *A*, which is attached to the pipe line. A cylindrical piece of soft rubber, *B*, perforated at the center, fits into a cylindrical cavity in the seat. A follower plate, *C*, is pressed against the soft rubber by an outer headpiece attached to the base by a screw thread. When the thick rubber disk is put under compression by the follower plate and head, the perforation is made smaller. Adjustment can be made to any desirable extent up to complete closure. It is evident that the valve avoids all pockets and that the wearing surface is restricted to the rubber part.



New type of valve used on lime circuit at Inspiration Consolidated Copper Co.'s mill

Spotting Cars at Chutes

At the Engels mine, at Engelmine, Calif., ore trains are loaded at the adit level by two chutes equipped with underswung gates operated by air cylinders. To avoid the customary delays in spotting cars at the chutes, a heavy hook is fastened in the concrete wall at the chute. The hook is raised and lowered from the loading platform by a rope and block. The length and position of the hook are such that when the hook is dropped over a car it will catch in the corner of the car when the latter is in the proper position below the chute. Thus, as the train is slowly moved up, the hook is dropped over the empty car and stops it at the right position without the necessity for signals to the motorman. The device has proved to be a time saver. A spring connection at the eyebolt fastening would reduce the shock of stopping the train to a minimum.



Method of spotting cars at chutes

Intermittent Agitation and Decantation

By Leon P. Hills

The flow sheet of an intermittent agitation and decantation system for use in small cyanide plants is shown in Fig. 1. The cost of such a plant is only slightly more than that of a leaching plant and operation is quite as simple. The agitator, known as the Tuolumme agitator, is of the Pachuca type so improved as to admit of picking up and restoring the thickened pulp to a suspension. The agitation tank, which also serves as a thickener, should be of the largest practicable diameter. The height is determined by the settling properties of the pulp.

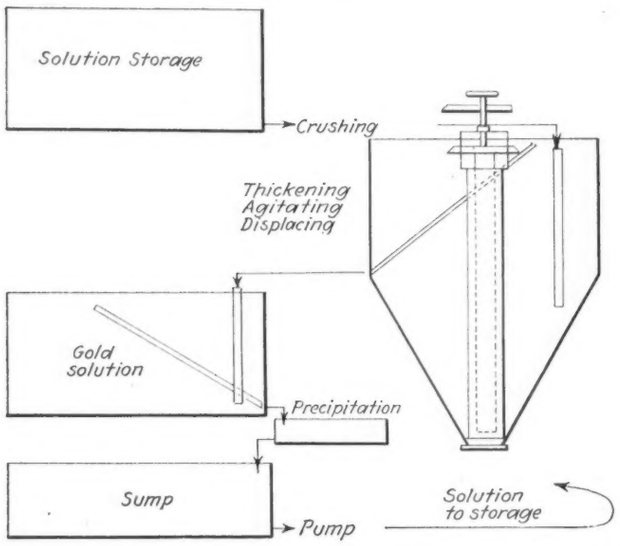


Fig. 1—Flow sheet of an intermittent agitation and decantation system for use in small cyanide plants

The pulp is introduced into the agitator, Fig. 2, through a vertical pipe (removable), so that the solution (in the case of direct treatment), or the water (in the case of indirect treatment), can clarify itself before overflowing, the solution going to precipitation, or the water to waste. The charge being thickened to the required specific gravity, the feed is diverted to another agitator, and agitation started (or in the case of indirect treatment the charge is allowed to settle, decantation completed, and a cyanide solution run on).

The reclaiming of the settled pulp is as follows: The central air lift consists of two pipes, one inside of the other. Both pipes are carried upon a frame which can be raised and lowered by means of a vertical threaded shaft and hand wheel. The inner pipe is the lift column and the outer pipe, called the protective pipe, provides an annular passage for the return of the pulp to the bottom of the cone. The protective pipe is at its lowest position, the bottom engaging the sides of the cone and the top below the surface of the solution. The pulp settles about the protective pipe, but is prevented from settling about the air jet and lift pipe. Turning on the air immediately starts circulation of the solution, as indicated by the arrows in Fig. 2. The protective pipe is then slowly raised and the settled pulp is worked back into suspension as fast as the circulating solution is capable of picking up the pulp.

Agitation is continued until the gold and silver are dissolved. Having attained this, the protective pipe is lowered and agitation maintained for a few minutes to free the pipe. Barren solution or water may be introduced at the top of the protective pipe, thus flushing out the remaining pulp in the lift pipe and the surrounding annular space. Decantation follows as the pulp settles and the solution clears. After completing decantation barren solution is run in and the pulp brought back into suspension. Washing may be repeated as many times as necessary. For discharging the tank, water is run in and the pulp brought into suspension. The outlet is opened and the pulp discharged.

In 1913, I operated for more than four months a plant embodying the foregoing ideas. Mechanical operation was satisfactory. The ore was crushed in a twenty-stamp mill in water, 30 or 40-mesh battery screens, and run over amalgamating plates and thence directly to agitators, of which there were four, each 8x24 ft. The accessory tanks were the same as shown in Fig. 1. The time required for the pulp to be picked up and brought into suspension was about twenty minutes. Air was introduced at the bottom of the lift pipe through a $\frac{1}{4}$-in. pipe with a nozzle opening of $\frac{1}{8}$ in. The air pressure was eighty to ninety pounds.

The advantages of the arrangement shown are low first cost; no line shafts, belts or pulleys; low upkeep, and low power consumption. The arrangement is flexible, and the length of treatment can be varied. The plant could be operated on a one-shift basis.

Where an ore is to be treated that does not settle readily, additional tanks can be provided for a longer period of settling and clarification. Partially settled solutions would of necessity be decanted from the agitators.

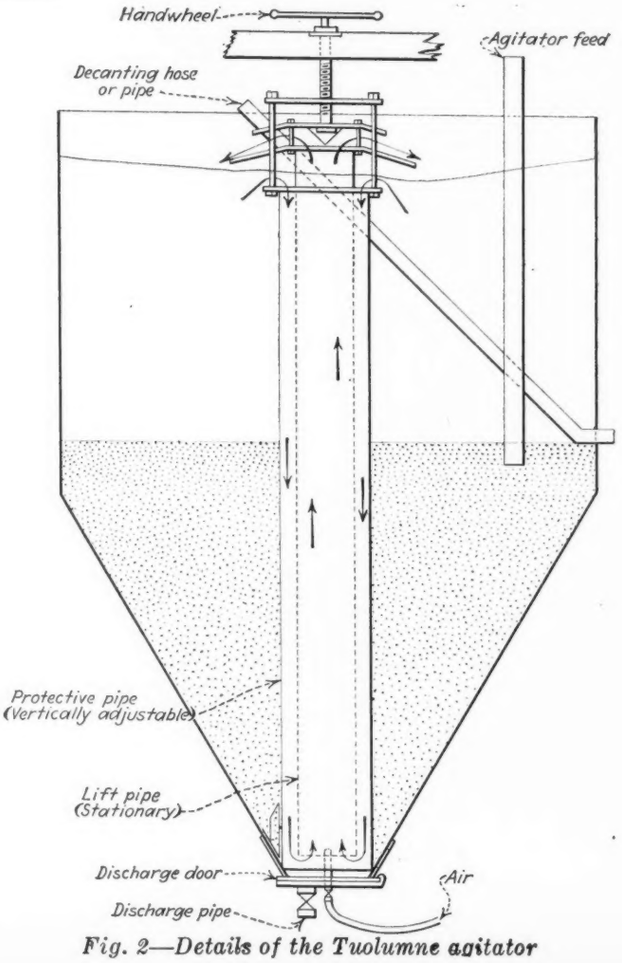


Fig. 2—Details of the Tuolumne agitator

Discussion

"Engineering and Mining Journal-Press" is not responsible for statements or opinions published under "Discussion." In many cases the views expressed are diametrically opposed to editorial policy and belief.

The Undegraduate Replies

THE EDITOR:

Sir—The editorial "Engineering Students Under the Microscope" in the Aug. 15 issue of the *Mining Journal-Press* prompts me to reply. "Possibly the student is conscious of the attention he is getting." He is, but he does not squirm under the close scrutiny, because he is giving his best efforts to the acquisition of as thorough a foundation as four years of study in an engineering course will give. He does give back look for look, and his gaze is met by a cold, unresponsive eye. He is at the wrong end of the microscope without knowing it, but the effect on him is apparent.

He has chosen his profession feeling that in it he will find his life work, the opportunity to give the best that is in him. It is hard, exacting work; the Arts and Science men point out the easier course and ask why he deprives himself of so much of college life by taking the course which requires afternoons in the laboratories and nights over the books and problems. He is firm in his decision and little "phased" by his classmates. It is only when he comes in contact with older men that he is disheartened.

"Your son? Oh, yes. You're in college now, aren't you? Taking anything special?" asks Father's friend after the introduction. "Mining engineering? Why the woods are full of them! Had three years of it? Well, then it's too late to change."

More frequently it is a subtler remark, particularly if it comes from a mining man.

"Mining! Have you any idea where you'll locate? Things seem to be a bit slow nowadays for the youngsters. Hope you can find something; might try Chile Copper."

Rarely does the student receive any encouragement, the esprit de corps shown in other professions when doctors or lawyers give a welcome hand of greeting to undergraduates in their professions, though there is much the same overcrowding in them. When the rare event occurs, it is a gala occasion, and a man like Dean Probert of the Mining School at the University of California, who in a personal conversation this last summer said, "For the man who can resist the call of the city and who is willing to forego certain pleasures and conveniences, mining offers a field in which to prove himself. Mining engineering is a splendid profession and will take the best that any man can offer," does much to counteract the indifference and apathy so generally shown, by the force of his personality and the stimulus of his belief in the profession.

The mining student is not "a voice crying in the wilderness" of American colleges and universities against the buyers' market. He realizes that upon his graduation he will be bid for as a commodity to be obtained at the lowest possible price. He is willing to face the long stretch ahead with other graduates starting ahead of him with handicaps if only the older mining men will give him a word of encouragement and not condemnation. W. W. WATSON.

Duluth, Minn.

Diesel Engines and Depreciation

THE EDITOR:

Sir—The article in your issue of July 25, 1925, entitled "The Diesel Engine in the Mining Field," by Felix Edgar Wormser, contains the statement on page 133, "If twenty-five years is assumed as the reasonable life expected, the depreciation to be charged off each year is roughly 4 per cent of the initial cost; if the period is taken as 16⅔ years, the depreciation amounts to 6 per cent per annum, a common charge."

The author fails to consider the item of accumulated interest on the depreciation reserve, and his assumptions of depreciation are too large.

Where D = the depreciation rate,
R = the interest rate,
N = the life of the unit

we get $D = \dfrac{R}{(1+R)N-1}$

Assuming an interest rate of 6 per cent and the life of the machine at twenty-five years,

$$D = \frac{0.06}{(1.06)25-1} = 1.8 \text{ per cent}$$

With a life of 16⅔ years, $D = 3.7$ per cent, and not 4 per cent and 6 per cent respectively, as given by Mr. Wormser. In order to charge off depreciation rates of 4 per cent and 6 per cent on 25-year and 16⅔-year periods respectively, the interest rate (R) would have to be approximately 1 per cent only. W. D. ABEL.

Los Angeles, Calif.

Classification of Technical Literature

THE EDITOR:

Sir—Evidently the classification of the Bureau of the Census does not consider the output of technical literature (books, journals, and pamphlets) as worthy of special mention, and so groups it with all manner of publications. But scientific papers should be given due value. *The Publishers' Weekly* for May 16, 1925, gave advance tabulation of the production of books and pamphlets in the United States from data for 1923 collected by the Census Bureau. There is fiction, juvenile, general, poetry and drama, history, religion and theology, education, law, and all others. "General Literature" is a new classification in 1923, and accounts for 61,915,885 pieces; "Education" has 96,479,723 pieces; then there is a general group of "All Others" of 60,002,141 pieces.

Inquiry at the Bureau of the Census elicited the reply that although the census schedule did not call for technical publications, it is probable that this class was reported under "Education." The number of technical books, periodicals, pamphlets, etc., therefore, produced in 1923 cannot be determined from the census returns.

In justice to science it would appear only fair to give such publications a separate classification.

Pittsburgh, Pa. R. P. BRAUN.

The Price of Lead

THE EDITOR:

Sir—I have noticed a quotation from your publication entitled, "Fortune Smiles on the Lead Producer." This does not state the facts entirely and has a direct bearing on a subject in which I am most vitally interested, that is lower prices on lead.

The statement as made in your article that "the manufacturer of lead products is also working at or near capacity and is not worrying about the high price of raw material, because the price of his finished product is correspondingly higher," is certainly not true in the battery industry, as storage batteries were never lower than they are at the present time, and I believe that all battery manufacturers are interested in seeing lower prices on pig lead, as they are the largest users of pig lead and it is a big part of the actual cost of the battery.

Personally, I believe that there is too much prosperity among the lead producers and that a further advance in the price of lead is going to result in more harm than good to them. ROBERT D. MOWRY.

Chicago, Ill.

Consultation

Selling Blister and Copper Matte

"The article about the marketing of copper in 'Marketing of Metals and Minerals,' discussing the subject of custom smelters, mentions two ways to market matte and blister.

"I am under the impression that one other way may also be employed for fixing the price: 'The price of matte and blister shall be decided according to the ruling market price of electrolytic copper (the price mentioned in the *Engineering and Mining Journal Press*) at the time the material comes out in the refined copper form, based on the percentage of copper obtainable from the refining of the above mentioned materials. The time of fixing the price may be designated at three months after the mentioned material is delivered at the refinery, which is generally required for the refining of copper. This method will not necessitate direct payment of refining charges, and the custom smelters, as well as the suppliers of the material, will take the risk in fluctuation of copper quotation for determining the price of matte and blister copper.'

"I would like to be enlightened with information for the following query: 'By what calculation the equivalent f.a.s. New York or f.o.b. refinery quotation of copper, spelter, and lead can be figured out from the quotation of respective metals at the London Metal Exchange.'"

The two ways to which the correspondent refers are: (a) Outright sale of the matte or blister at an agreed price based on the assay and the character of the material purchased. (b) The toll system, whereby the buyer returns to the seller a quantity of copper equivalent to the amount which it is estimated can be recovered from the material purchased. The original producer designates the sales agency that is to sell the finished metal and his proceeds are the selling price minus commission and the total cost of refining, which necessarily includes a reasonable profit for the refiner. Except for small miscellaneous lots, very little matte or blister is sold by the first method. Then the buyer protects himself by making a material reduction from the expected recovery and from the selling price that he expects to realize. The purchase of matte usually is based on a contract similar to that used for ore concentrate.

Most of the large producers have their blister copper refined on a toll basis as described under "b." Some fairly large producers who have regular quantities to market each month have contracts similar to that described in the correspondents question.

Provisions of a typical contract form for blister copper are shown herewith.

BLISTER COPPER CONTRACT FORM

Period: One year from date of contract.

Approximate Tonnage: 500 to 800 tons per month.

Delivery: F.o.b. cars or wharf at eastern seaboard refinery. Buyer reserves the right to divert to any other refinery, and, in the event of diversion, any advantage or disadvantage to be for buyer's account.

Gold: If 0.05 oz. or over per 2,000 lbs. pay at $20 per ounce.

Silver: Pay for 99 per cent of the silver by commercial assay at the average of the New York quotation for silver as given by Messrs. Handy & Harman for the ten days next preceding the eighty-fifth day after arrival of the blister at refinery.

Copper: Pay for 100 per cent of the contents as determined by electrolytic assay, less a reduction of (10) lb. of copper per 2,000 lbs. of blister received, at the average of the daily net refinery quotations for electrolytic wire bars as shown in the *Engineering and Mining Journal-Press* for the thirty days preceding the sixtieth day after date of arrival of the blister at our plant.

Base Charge: $25 (this figure may be lower or higher) per short ton of blister, on the basis of the blister containing 99 per cent copper or over by wet assay. This base charge to be increased at the rate of $3 per unit if the copper content is less than 99 per cent by wet assay. Buyer reserves the right to decline to receive any blister containing under 96 per cent copper.

Weighing, Sampling and Assaying: Refinery weights to govern. Shipper to have privilege of representation.

Payment: Gold and silver to be paid for on the ninetieth day after arrival of the blister at refinery.

Value of copper less base charge and other charges, if any, to be paid on the sixtieth day after arrival of the material at our refinery.

The calculation for determining the equivalent f.a.s. price on this side from the London price, assuming that the two markets, New York and London, are on a parity, is simply the subtraction of the various charges and costs involved in moving copper from New York to a British port. These include : (a) freight, (b) insurance, (c) sales commission, (d) port charges, and (e) delivery charges. In the case of copper these amount to about 0.25c. per pound to British destinations. Incidentally, the freights to some ports on the Continent are less.

News of the Week

The Mining News of ENGINEERING AND MINING JOURNAL-PRESS is obtained exclusively from its own staff and correspondents, both in the United States and in foreign fields. If, under exceptional conditions, material emanating from other sources is published, due acknowledgment and credit will be accorded.

Summary

ANACONDA announces plans to increase copper and zinc refineries at Great Falls 33 per cent zinc. The zinc plant now under construction to be in operation early in 1926.

Tonopah monthly production now about $250,000, being restricted by reason of increased flow of water. Additional pumping facilities being installed.

Cerro de Pasco producing 7,000,000 lb. copper per month. Cottrell precipitation working satisfactorily.

Tri-State irrigation and power conference at Phoenix, Ariz., ends in failure to reach any agreements.

Lamberton mine, at Hibbing, Minn., uses ore drier and reduces moisture content from 18 to 9 per cent.

U. S. Bureau of Mines continues its studies of metal mine ventilation, mine drainage, and ore dressing as applied to non-metallic minerals.

A. S. & R. Co. options mining properties in State of Oaxaca, Mexico. Pedrazzini company ships rich cargo of ore from Sonora.

Four hundred miles of mine workings at Bisbee, Ariz. Many of workings directly under the city.

Mine labor demanding forty-hour week in Australia as against forty-eight hours. Many mines already on forty-four-hour basis.

Directorship of Bureau of Mines awaits Hoover's action. Apparently difficult to find suitable man.

Anaconda Copper Co. Announces 33⅓ per Cent Enlargement of Great Falls Works

Zinc Plant Now Under Construction to Be Completed Early in 1926 and in Operation

The Anaconda Copper Mining Co. through John D. Ryan, chairman, and C. F. Kelley, president, announces that practically the entire Great Falls plant of the company will be enlarged about one-third. Mr. Ryan stated: "The demands being made upon the various non-ferrous metals' industries as a whole are showing a remarkable increase, due to the enormous quantities of copper, lead, and zinc that are required to meet the growth of transportation, building, and electrical industries in most of the countries of the world. Notwithstanding copper is being produced at a rate never exceeded in the history of the industry, available stocks have shown a steady decline and, proportionate to the demand, are lower than at any previous time. The volume of copper business done in the last three months exceeded that of any like period in the industry. The same may be said of the output and demand for lead and zinc.

"The increase in industrial activity and of the population of the middle western states is rapidly broadening the market in that section for copper and copper products. To meet this demand we are considering the enlargement of the copper refinery and rolling mills, at Great Falls, about one-third. Great Falls, because of its available hydro-electric power and favorable freight rates to the middle west, as against other refining locations, is admirably situated to supply that section, and the proposed extensions will enable it to do so to the extent that copper is produced in Montana. It is our aim to have facilities at Great Falls for refining all copper produced in Montana and, as rapidly as market conditions will permit, to put the same through, at least, the primary stage of manufacture at Great Falls."

The present zinc plant at Great Falls is in the midst of construction which will give an additional capacity of one-third, so that capacity of refined zinc will be 240,000,000 lb. per year. In addition to handling Montana zinc ores the company is handling zinc ore from Utah and Idaho. The new zinc plant should be in full operation early in 1926 and the new copper plant by the end of that year. The enlargement of zinc-refining facilities will have the effect of opening a great many zinc mines.

Alaska Juneau Mined 283,900 Tons in July

ALASKA JUNEAU in July, 1925, mined and trammed to mill, 283,900 tons, which yielded $152,100 or 53.57c. per ton. Operating expenses, including taxes and miscellaneous expense, were $145,250, or 51.16c. per ton, leaving an operating profit of $6,850. Other expenses and accrued charges totaled $35,250, leaving a deficit of $28,400 for the month. The additions to the milling plant are about 48 per cent completed and the Ebner preliminary work is nearly 46 per cent completed.

Tonopah District Monthly Production Is Now About $250,000

Increased Flow of Water Stops Work on 2,000 Level—Additional Pumping Power Installed

The production rate in the Tonopah, Nev., mining district continues unchanged. Gross production for August will probably not exceed $250,000. Owing to a large increase in the water flow, as the workings are driven westerly, the Tonopah Extension has found it necessary to discontinue all development work on the 2,000 and deeper levels. The water level is approximately 300 ft. above the 1,540 level. It is expected that work will be resumed on these lower levels some time in September, after the second 2,000 hp. Diesel unit is in operation. The Tonopah Extension operated at a loss of $26,973.23 in July, the gross production being $72,345.07.

Operating officials of the Tonopah Western, which controls about 1,000 acres of ground to the west of the Tonopah Extension, are expected to arrive in Tonopah at an early date. Their Great Western shaft is 1,200 ft. deep, and a promising vein was cut on the 1,100 before increasing water troubles resulted in a shutdown. It is believed there will be sufficient stand-by power available for all necessary pumping when the Tonopah Extension second 2,000 hp. Diesel unit is in operation.

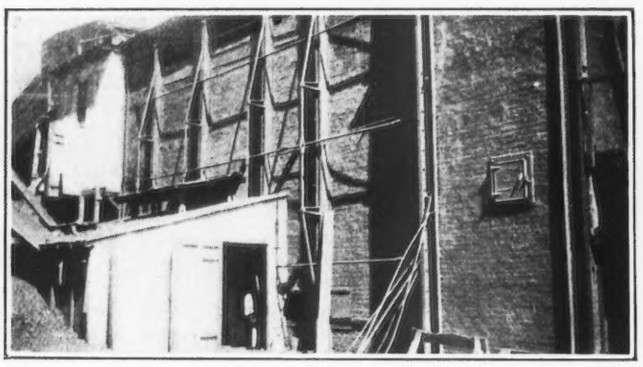
The Tonopah Belmont Development Co. has cut a new orebody on the 800 level, northeast from the shaft. Shaft timbering at the Belmont shaft has been completed and development work is again normal.

Lamberton Mine, in Minnesota, a Steady Producer

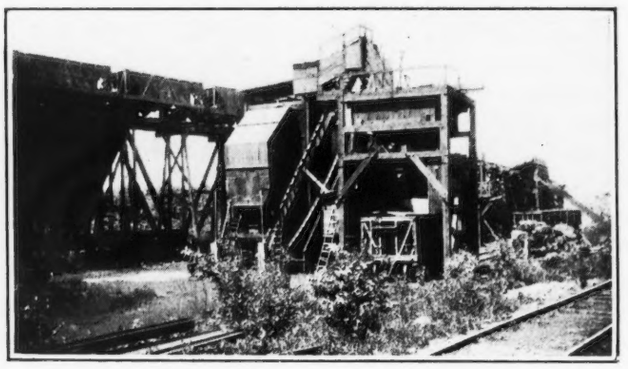
Although the iron ore in the Lamberton mine, 6 miles west of Hibbing, Minn., is so high in moisture it must go through a drying plant before of commercial grade, the mine has been a steady producer since it started in 1922. The property is an open pit mine operated by Butler Brothers, and ships about 100,000 tons per year.

Ore is loaded by a Model 36 Marion shovel into 12-yd. dump cars and sufficient is loaded during the day shift to supply the drying plant for twenty-four hours. The cars discharge the ore into a bin, from which the ore is carried on belt conveyor to a bar grizzly, where the fines pass into the drier while the lumps go to a gyratory crusher and then into the drying cylinder. The drier consists of a steel cylinder 8-ft 6-in. diameter by about 60 ft. long, revolving at a variable speed, governed by the wetness of the ore, but averaging 3½ r.p.m. The cylinder is bricked in, and as the ore passes through the cylinder, heat is applied to the outside from hand-stoked furnaces that burn about sixteen tons of coal in twenty-four hours. The moisture is reduced from 18 to 9 per cent on thirty fifty-ton cars, which is an average twenty-four-hour run.

The plant works two shifts, with seven men on each. One locomotive brings the ore from pit to the storage yard while another takes care of the plant. All belt conveyors, crushers, and revolving cylinder are electrically driven, power being secured from the Minnesota Power & Light Co.



Rotary drier inclosed in brickwork, Lamberton mine



Railroad trestle and bin, at drier, Lamberton mine

Old Dominion Mill Being Enlarged

Owing to the improvement in the outlook for copper, the Old Dominion Copper Co. has begun extensive improvements to its plant at Globe, Ariz. The principal project is the enlargement of the concentrator by increasing its capacity from 1,300 to 1,500 tons per day. This work will include the installation of a dust-control machine to recover fine ore that is lost in the form of dust, and a new crusher. The construction will be completed in about three months and will cost $140,000. In the mine a new pumping plant is being installed on the 2,200 level. There are now 1,000 men on the O. D. payroll. When the smelter was operated, not so many men were employed.

Hydraulic Mining Planned for Properties in the Catalina Mountains

The gold-bearing placers in the Canada del Oro, in the Catalina Mountains, 27 miles north of Tuscon, Ariz., will be developed by the erection of huge storage dams to maintain a supply of water, for hydraulic mining, according to W. L. Cochrane, who is reported to represent Kansas City capital. For many years the gold deposits in the Canada del Oro have been worked in a desultory manner. When the danger from Indians was grave, parties of fifteen or twenty men banded together for protection while seeking the precious metal. The Canada del Oro gained nation-wide prominence when the novelist, Harold Bell Wright, used it as the site of his novel, "The Mine With the Iron Door." Mr. Cochrane is reported to have already optioned 3,300 acres of land from owners.

Tri-State Conference on Development of Colorado River Ends in Failure

The Tri-State conference held in Phœnix, Ariz., recently, and attended by delegations from Nevada and California, broke up within a few hours after the meeting convened. The Arizona Committee stated openly that its members were in no wise bound or limited in their discussion except by their duty to their state. Governor Hunt of Arizona addressed the meeting at the opening session, giving his views in regard to development of the river.

The Nevada delegation, backed up by the California delegates, advanced an arbitrary promise as the basis upon which negotiations or even discussions by the joint committee should proceed. They insisted that their request, which provided that Arizona must unreservedly agree that the first construction of dams on the Colorado River should be at Boulder Canyon or its vicinity, was to be taken as a prelude to any negotiations or discussions. They would not even agree to a discussion concerning the allocation and distribution of the water and power made available by the Boulder Canyon dam until Arizona had agreed to the principle that the initial development should be at that location. The conference ended without reaching any agreement. In the meantime the project remains in *status quo* and power goes to waste.

Cerro de Pasco Produces 7,000,000 Lb. Copper Monthly

During the first six months of this year Cerro de Pasco produced about 32,500,000 lb. of copper, 7,000,000 oz. of silver, and 18,000 oz. of gold. This compares with output in the first six months of last year of approximately 45,000,000 lb. of copper, 7,000,000 oz. of silver and 27,000 oz. of gold. For the last two months the company has had two reverberatories in operation. Part of the Cottrell precipitator has been in operation since July 24. The precipitator is working satisfactorily but it is impossible as yet to determine just what amount of the fume is being recovered, as no clean-up of the precipitated dust has been made. The company has settled with all farmers claiming smoke damage, and no further trouble is expected on that score, now that the Cottrell process is working.

Although the smelter has produced as much as 11,000,000 lb. of blister copper a month, it is probable that for some time at least the company will keep production at 7,000,000 to 7,500,000 lb. of copper a month.

Owing to the high silver and gold content of a large part of its ores, the company is one of the lowest-cost producer of copper in the industry.

Holly Cons. Producing $40,000 per Month

Heavy Rains Interrupt Mining at Gerlach

The Holly Consolidated, working a lead-silver property in the Eureka, Nev., mining district, including the Eureka-Holly and Bullwhacker mines, is producing about $40,000 of concentrates and high-grade ore shipments per month. About 100 tons of ore per day is being handled with an 80 per cent recovery. Company officials estimate that there is sufficient milling ore above the 600-level to continue operations on the present production basis for approximately three years.

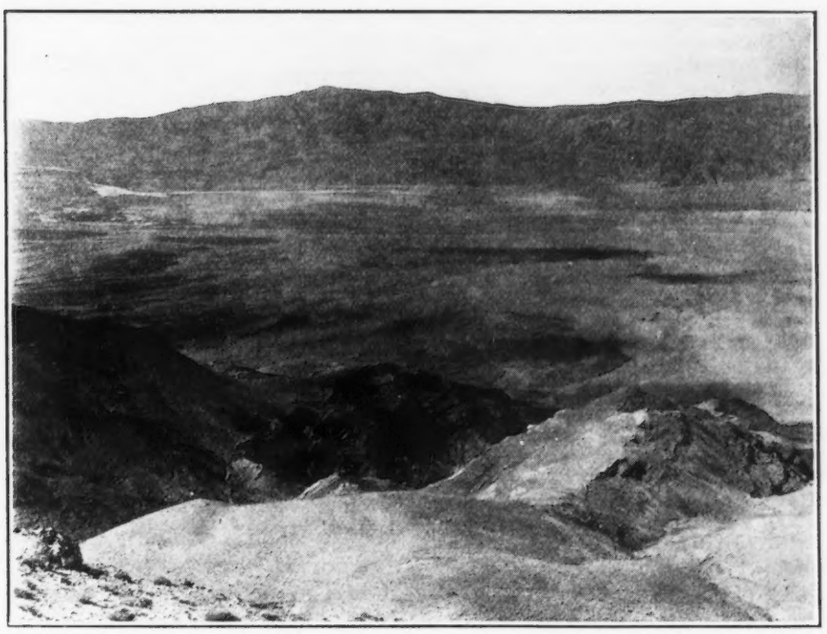
Operations at the Leadville Mines, a lead-zinc-silver property, about 40 miles north of Gerlach, Nev., have been interrupted by heavy cloudbursts which destroyed the road for many miles. At the present time, the road is not passable for trucks, but the county commissioners have taken steps to repair the damage and reconstruction has commenced.

The Experimental Plant of the Chemical Development and Reduction Company

By C. M. Dawson, Beatty, Nev.

A reconnaissance of Death Valley, California, and vicinity impresses one with the undeveloped mineral resources of this district. The Funeral Range, the Panamint Range, and the Saline Valley are dotted with prospects and small mines that are capable of producing a large aggregated tonnage of good commercial ore. In most cases these mines and prospects are idle, due to a combination of conditions that makes marketing of anything but high-grade ore out of the question. One operator states that only a small margin of profit could be realized on $50 ore, giving as the cause the inaccessibility of the country, long truck hauls over extremely bad roads, lack of water, and other things that add to the expense of mining.

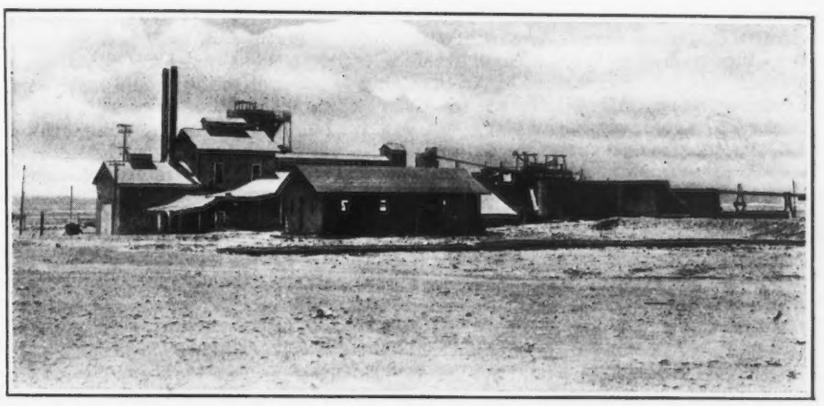
The existing conditions and the possibilities of an ample supply of ore in the future are the main factors in prompting the Chemical Development & Reduction Co. to establish an experimental plant at Keeler, Calif., in anticipation of building a custom plant to treat the ores from this district. Experiments are being conducted to perfect a chemical reduction process, using the various chemicals that may be obtained locally from natural sources. Recent tests on different ores indicate that the process will be successful on a commercial scale. Those interested in mining are optimistic, since there is a possibility of a near-by market for their ores.



View across Death Valley from the top of Funeral Mountains. Panamint range in the distance

Briefly, the process of treatment is as follows: The ore is ground in salt water to about 60 mesh. It is then conveyed to an agitating tank and brought to a temperature of 170 deg. F. by live steam. Sulphuric acid is added, and the hot acid solution is agitated from two to four hours, sufficient to desolve the carbonates and oxides. By the addition of flotation oil in the bath, the sulphide contents, which are insoluble in this solution, are brought to the top and skimmed. The sulphides are then conveyed to a roaster for desulphurizing and afterward returned to the agitating tank, where the oxides and carbonates are dissolved. After further agitation, the hot liquor is decanted to several tanks for precipitation. The liquor is then returned to the agitation, and by the addition of salt water and roasted sulphides the proper acidity is maintained without the necessity of adding fresh sulphuric acid. The company will market white lead, red oxide of iron, cement silver, cement copper, and zinc sulphide.

Keeler is an ideal location for the plant, situated as it is on the shore of Owens Lake, where an abundant supply of sodium chloride is economically obtained by using the waste water from the Natural Soda Products Co.'s plant.



Experimental plant of the Chemical Development and Reduction Co., Keeler, Calif.

Spokane Local Stock Exchange Demands Information Before Listing

Information, including the amount of stock outstanding, whether assessable or non-assessable, banking references for officers and directors, a copy of the last annual report and even a history of the company, must be given by mining companies hereafter if they wish their stocks listed on the Spokane exchange.

The stock of any company that has not at least 15 per cent of its stock outstanding and in the hands of other than its officers, directors, syndicate managers or agents, will not be carried on the board. This makes it difficult for stock to be manipulated. A questionnaire has been prepared by the exchange and is ready for companies which desire listings.

Reeves Davis Mining Properties to Be Sold

Due to the death of the owner, the Reeves Davis mining properties and water rights in Siskiyou County, Calif., are to be disposed of by an executor's sale. The properties includes the Davis Consolidated Placer Mine, 1,000 acres and equipment; Hunter's Paradise group, 400 acres of copper claims and equipment; Grey Eagle Extension, three claims; a water-power tunnel site and 160 acres of placer claims. W. F. Davis, 427 J Street, Sacramento, Calif., is executor.

White Hills Silver Mines, Inc.

The old White Hill mines, of Mohave County, Ariz., have been taken over by a new corporation which will be known as the White Hills Silver Mines, Inc. The president is J. K. Turner, consulting engineer for the Jumbo Extension Co. of Nevada. L. L. Wallace is vice-president and Ben Gill, another Nevada mining man, is the secretary-treasurer. The new company is capitalized for $5,000,000, and plans to sink a 1,000-ft. shaft, from which lateral development will be undertaken.

The principal veins crossing the property are the G. A. R., Norma, Schaefer Treasure, Prince Albert, African, Garfield Fraction, Huldah, and Occident.

News From Washington

By PAUL WOOTON
Special Correspondent

The Anthracite Strikes of 1925 and 1902

Bureau of Mines Directorship Pending; Studies of Mine Ventilation, Drainage and Non-Metallic Minerals Continued

THE anthracite miners' agreement came to an end this year in an entirely different setting than did that of 1902, when President Roosevelt intervened. Then there frequently was real misery among the mine workers. Their standard of living was below that in many other industries. Then there was a great body of consumers to whom substitutes were unfamiliar and to a considerable extent unobtainable.

As the agreement came to an end this year the mine workers were enjoying a standard of living that exceeds that of many other American industries and is so far ahead of that of any group in Europe as to be incomparable. There is no poverty or genuine grievance among them. They are prosperous and are saving money.

The mine workers have forced up the wage rate until their product has become a luxury. Incidentally, they have opened the way for the entry of oil, coke, and high-grade soft coal into what could have been kept an exclusive market. A situation has been brought about where adjustments could be made quickly were anthracite to disappear from the markets. It hardly would be missed when the second winter arrived. The consumers are bending their efforts to free themselves of dependence on a single fuel.

The Bureau of Mines Directorship

It is becoming increasingly clear that one of the outstanding problems faced in connection with the readjustment of the Department of Commerce to accommodate the federal government's activities on behalf of the mining industry, is the selection of the right man to fill the directorship. Secretary Hoover has not forgotten the business in which he first won renown. He expects to put through a program that will provide a much greater degree of federal recognition than ever before has been accorded the industry, which almost equals agriculture in the amount of new wealth created.

Mr. Hoover's announced intention of trying to secure a leader in the mining industry for the Bureau of Mines directorship implies no discourtesy to those now occupying the higher places in the Bureau's organization. There is general recognition that these men have made conspicuous successes of their jobs and are recognized authorities in their specialties. It has been Mr. Hoover's policy, however, to turn to industry to fill places in his department. The soundness of that policy has been demonstrated again and again during his administration.

The director of the Bureau of Mines, it is felt very generally, should be an engineer, and a man of large caliber familiar with the mining industry in its largest sense. Generally it is almost out of the question to induce such a man to become the director of a government bureau, but in this case an unusual advantage exists. There is reason to believe that Congress will regard with favor the plan to have an under secretary of mines. The man selected at this time to fill the directorship in all probability would be the man in training for the larger job. With that enviable post in the offing, the directorship of the Bureau of Mines immediately assumes a much greater attractiveness.

Metal-Mine Ventilation Studies to Be Continued

Arrangements have been made to continue the investigations of metal-mine ventilation at Butte through another fiscal year. These tests have been conducted jointly for several years by the U. S. Bureau of Mines and the Anaconda Copper Mining Co. under an informal co-operative agreement which has been very satisfactory.

Mine Drainage in Alabama Iron Mines

Intensive work is in progress at the Southern experiment station of the U. S. Bureau of Mines at Tuscaloosa on problems involved in mine drainage in the iron-producing region of Alabama. Collapse of workings and falls of rock in many cases are traceable directly to the inlet of water. The work involves a study of rainfall and run-off.

Ore Dressing and Its Application to Non-Metallic Minerals

Ore dressing as applied to non-metallics has lagged behind similar processes in connection with the preparation of metallic ores. For that reason research is to be pursued actively during this fiscal year at the Brunswick station of the U. S. Bureau of Mines. A detailed study is being made at this time of gravity concentration of fluorspar ores.

A study of anhydrite has led to the conclusion that this waste product can be used to advantage, in certain mixtures, as a cement retarder. It also has been developed that the use of proper crushing equipment makes unnecessary the calcining of flint to make grinding easier.

Highway Construction in Alaska

Mileage, rather than quality, will continue to characterize the Alaskan road policy of the Corps of Engineers. An announcement to the foregoing effect was made by Major General Harry Taylor, the Chief of Engineers, on his return to Washington from a trip to Alaska. While roads will be maintained in a serviceable condition, General Taylor is convinced that the public interest will be served best by extending the system of roads and trails as much as possible. He discussed the road question with the people in the interior, as well as with those in the centers of population, and found opinion almost unanimously in favor of spreading the road appropriation over the greatest possible mileage.

Though some impatience has been manifested because of the delay in developing roads, General Taylor believes the cost of speeding up automobile road construction is not justified. The policy being followed is to open a trail first, or to do enough clearing for thawing the first year, and develop the road progressively. This frequently means that it cannot be used by automobiles until the fourth year. To push construction faster results in much higher costs per mile.

Four Hundred Miles of Mine Workings at Bisbee

According to Harry Hayes, mine superintendent of the Copper Queen branch of the Phelps Dodge Corporation, there are nearly 400 miles of tunnels, drifts, and underground passages honeycombing the mining properties at Bisbee, Ariz. Many of these workings are directly under the city. Of the many men employed by the company, only 25 per cent are actually engaged in ore extraction; 24 per cent are employed in haulage, 12 per cent on development work, 9 per cent on repairs, and the remaining 30 per cent are in offices, stores, and outside works.

Kay Development Company Opening Deeper Orebody

Development is continuing in the new orebody on the property of the Kay Copper Co., recently discovered. Workmen have driven the drift a distance of 22 ft. through the vein, which lies between limestone and porphyry formations. The entire distance of 22 ft. discloses a solid ore body, complex in nature, carrying silver, lead, zinc and copper sulphides.

This exploration is 600 ft. below the surface and 350 ft. below the Archbold tunnel level. It is the first discovery of sulphide ore below the oxidized lead zone of the district, which on the upper workings has furnished extensive tonnage in the past and still continues to produce.

California Zinc Co. Producing 2,000 Tons of Zinc Ore Monthly

The California Zinc Co. is employing 300 men and has taken a premier position among western zinc producers by shipping 1,500 to 2,000 tons of concentrates per month. Shipments of zinc oxide are made to Baltimore paint factories. The company is operating the Bully Hill mines and the mines at Ingot, Shasta County. These mines in early days produced copper and discarded the zinc content. Today both ores are utilized, although copper is of only minor importance.

Boulder and Gilpin Counties Colo., More Active

New Orebodies Discovered; Increased Shipments; More Men Employed than Any Time Since World War

The mining boom in Boulder and Gilpin counties, Colo., received considerable impetus recently with the striking of good veins of ore in several of the mines. Silver glance was uncovered in an old vein on the 1,040 level in the Caribou mine. In the Evergreen mine at Apex, six miles from Central City, good ore has been struck on the fifth and sixth levels. It is estimated that thirty days' more work will see the smelter which is being built near the mine completed. An electric pump is being installed in the Pittsburgh mine, beyond Central City.

Boulder county is this year noted for its new shippers of high-grade ore, among them the Monongahela, at Sunshine; the Fairview, at Cardinal, and the Emancipation and Aldmake, at Gold Hill, about eight miles north of Boulder City.

There are more men working in these camps than at any time since the World War. The outlook is good.

Ore Shipments From Small Mines in Caliente District, Nev.

The Republic mine, at Caliente, Nev., continues to make steady shipments of small lots of ore to the Midvale plant at Salt Lake. The last lot consisted of 20 tons, and assayed $2 in gold 4.5 oz. silver and 18 per cent lead. L. L. Burt and J. W. Matthews own and operate the property.

Two five-ton trucks are now engaged in hauling ore from the Tempuite district. The ore is taken from the old dumps in Treasure Gulch, and assays 54.7 oz. silver, 1.1 per cent lead, 0.20 per cent copper, and 3.5 per cent zinc. The dumps are estimated to contain 2,500 tons.

The Comet mill has been running intermittently pending the result of experiments now being made in the flow sheet. The last car of concentrate shipped assayed $90 gold, 90 oz. silver, and 27.5 per cent lead. Developments reveal a body of ore on the 160 level which materially enriches the average mill heads. Squires and Gemmill are in charge.

Hattie Gold Mine, Painkiller Lake, Ont., to Be Reopened

Definite plans have been completed for the resumption of operations at the Hattie gold mine, in the Painkiller Lake area of northern Ontario, with finances sufficient for a year's steady development. The mine will be operated under lease by the British America Mine Operating Co., capitalized at $1,000,000, which will bear all expenses, the Hattie to receive 45 per cent of the earnings. Shares of the British America to the amount of $100,000 are being sold to finance the Hattie development, which will be begun as soon as the company has $10,000 in the treasury.

United States Borax Co. Wins Over the American

IN 1920 the U. S. Borax Co. proceeded to perfect locations (all of which had been made on lode forms) on certain colemanite deposits in Clark County, Nev. Later the American Borax Co. blanketed these lode locations with placer locations and began to mine and ship the borax mineral colemanite. When the U. S. Borax Co. made application for patent in 1922 the American Borax Co. protested and an adverse suit was instituted in the local court. The case was removed to the U. S. District Court at Carson City, Nev. The decision of the court was in favor of the U. S. Borax Co., and to the effect that this company is entitled to a patent from the government on its lode locations. The result is that the placer locations made and asserted by the American Borax Co., were and are of no validity. This decision will also be of a controlling effect in the injunction suit now pending in which the U. S. company is seeking large damages from the American company for its alleged trespass upon the orebodies of the former.

Shortage of Water on Gogebic Range

Long-continued drought has so depleted the Gogebic water supply that mines in the district have had difficulty in obtaining enough water for their power plants. The mine water is too muddy for such use, and as much of the dirt seems to be in the colloidal state it requires special treatment before it is fit for use in boilers. Municipal sources of supply are also in a critical condition so the mines can get no assistance there.

Timber Butte Co., Modifies Flotation Process

After exhaustive commercial tests, Messrs. Sheridan, Griswold and Rossberg, of the Timber Butte Milling Co. (W. A. Clark interests), have perfected a modification of the flotation process, carrying preferential flotation to a very high degree, by the use of several cyanide compounds. It is understood that this process has been licensed to several of the large zinc-producing companies in the Northwest.

Southwest Metals Smelter May Open in October

Announcement has been made to the effect that the Southwest Metals Co., at Humboldt, Ariz., will resume operations late in October. This plant has been inactive for more than a year, but if present price of copper continues, it is expected to get it under way in the near future, and that an increased activity will be evidenced in the copper mines in the vicinity soon after the smelter is blown in.

Duthie Mines Resume Ore Shipment

Development on Marmot River; Early Shipments Expected

Duthie Mines Co., operating the Henderson mine, Hudson Bay Mountain, Omineca division, British Columbia, recently made its first shipment of 65 tons since the control of the company reverted to J. F. Duthie from the Federal Mining & Smelting Co., and after a year of idleness. From now on it is expected that a carload of ore will be shipped every week. About thirty men are employed in mining and development. The ore averages around $200 in silver and lead per ton.

The Marmot River Mining Co., operating in the Marmot River section of the Portland Canal division of British Columbia, has made a shipment of 64 tons of high-grade silver-lead ore to the Selby smelter, and is sending down the mountain by packhorses two to three tons per day toward a second shipment. The mine is developing well, a good body of milling ore having been struck in the bottom tunnel. The new discovery contains also some shipping ore. The output of the mine to date has been taken entirely from the upper working, which was developed last year.

Fifty-Ton Mill to Be Constructed by Cobalt Contact Co.

The Cobalt Contact Co. of Cobalt, northern Ontario, has decided on the construction of a mill of 50-ton capacity, work on which will be begun within two weeks. The ore reserves on Cobalt Contact, as well as those of the Red Rock, Green Meehan, and Law properties, on which the company holds options, are sufficient to keep the mill in operation for at least eighteen months.

Coeur d'Alene Activities

The Hecla Mining Co. reports net profits of $468,292 in the second quarter of 1925. The gross income was $934,914; operating expense, $372,153; taxes accrued were $54,000; and depreciation, estimated, was $40,467. During this period the company mined 77,343 tons of ore, from which it produced 12,361,720 lb. of lead and 345,910 oz. of silver.

The Tamarack and Custer Consolidated Mining Co. shipped 1,600 tons of crude and concentrated ores in July. Three hundred tons were zinc concentrates, shipped to Portland, Ore., for transshipment to Belgium. The remainder went to the East Helena smelter of the A. S. & R. Co.

Henry Ford's Red Bird Mine Is Developing

The Ford Motor Co. is developing the Red Bird Mine, Custer County, Idaho. A model camp has been established and 100 men are on the payroll. Robert N. Bell, formerly Idaho State Mine Inspector, was instrumental in interesting the Ford company in the lead-mining possibilities of Idaho. Operations at the mine are largely of a prospecting nature, and are understood to be satisfactory.

San Juan and Other Mines in Oaxaca, Mexico

Patio Process Not Dead—Activity in the Totolapam District

The option granted on the San Juan, La Riqueza and Peso de Oro mines by C. A. Hamilton and others to the American Smelting & Refining Co. has been extended. The company has also taken options, according to report, on the properties of the Consolidated Mining & Milling Co., at Taviche close to the San Juan, and is seeking options on the Conejo Blanco and the Escuadra mines. The company's engineers have been on the ground and made a survey of the millsite and water situation, and have made arrangements for taking over the living quarters of the Taviche Milling Co. A. W. Edelen, superintendent of the Angangueo plant of the A. S. & R., recently spent several days at Taviche going over the situation. Mr. Edelen advises that he will have charge of the Taviche unit if the negotiations are mutually satisfactory and that construction on the 150-ton mill will being at once. Acquisition of the other properties under consideration will bring the dump ore of milling value up to approximately 150,000 tons, all within a very short radius of the millsite and available for immediate treatment.

It is generally considered that the once-popular patio process has gone out of use, but the Noche Buena and Feliz Año mines, in the Totolapam district, about 75 miles east of Oaxaca City, still have in active operation six patios and are preparing to build six more. At present the stamp mill concentrates are packed to Oaxaca and sold to local metal buyers, but the excessive freight rate—65 pesos per ton—has caused the owners to decide to enlarge their patio facilities. They are now installing a new 9-ft. Lane mill. Manager MacEwan reports that the extraction by the patio process is unusually high.

Tulsa (Okla.), and Kansas City interests have taken over the La Leona and Gucamaya mines in the Totolapam district and are now developing the 600 level under the old La Leona workings. The La Leona has been a producer of ore that was found profitable to pack by mules to Vera Cruz, before the days of railroads, and ship from there to Swansea. W. A. McCarty, of Tulsa, and F. A. Ober, of Kansas City, are the principal owners. They plan to erect a mill soon.

Oaxaca-Mexico Development Co. Installing 50-ton Mill

The Oaxaca-Mexico Development Co. has placed orders for the largest pieces of its machinery for its 50-ton experimental flotation-cyanide plant which will be erected on its property in the Sierra Juárez, north of Oaxaca. The laboratory tests made by the Southwestern Engineering Corporation, of Los Angeles, show a very high extraction by the combined methods. The mill will be driven by a water turbine. An aërial tram of the jig-back type will connect the mine with the mill. C. A. Chandler will have charge of the metallurgical work.

San Fernando and La Española Mines Installing Mills

The San Fernando mine, owned by New York interests headed by W. H. Catlin, is planning to install a mill, and laborers coming in from the camp report that the ditch for the water line has been located and work begun. The ores are silver-lead, and some years ago were smelted to a limited extent in adobe smelters. Augustus Scogland is in charge. The mine is southwest of Oaxaca in the Mixteca district.

F. J. Woods, owner of the La Española mine, at Garzona, has plans for a small cyanide plant for his property and has much of the machinery on the ground. This ore is particularly amenable to cyanidation. Before the Madero revolution the property was in active operation.

San José Garzona Mine Opens New Ore Deposit

Reports from the San José Garzona mine are to the effect that the vein has been crosscut at the 100-meter level and shows five meters in width assaying about 1,000 grams of silver and high in gold. The mine is owned by the Girard interests, of Philadelphia, and is an *antigua;* one of the present working shafts is located in an immense cut, of which there is no history or trace as to when or by whom it was excavated. At another point, on a near-by river, there is a quantity of tailings which have cemented until they now have the appearance and hardness of native rock. They probably came from the Garzona mine.

Minas Pedrazzini Ships Car of Rich Concentrate

A car of the highest grade of silver-gold concentrate that has ever crossed the Sonora border was recently shipped from the Las Chispas mine of the Minas Pedrazzini company. The concentrate assayed 11.7 oz. gold and 1,875 oz. silver per ton. This company has effected a steady improvement in metallurgy since the change of management by Morton Webber. Concentrate originally shipped by Minas Pedrazzini averaged about 900 oz. silver per ton, with an extraction of approximately 84 per cent. The car of concentrates recently shipped was obtained at an extraction of 93.4 per cent, with a ratio of concentration of 56 into 1.

The local management is experimenting in the treatment of the concentrate so as to produce bullion locally. Not fewer than 300 mules were required to convey the car of high-grade concentrate from the mine to the shipping point at Nacozari. Production of bullion locally would radically reduce this expense and also smelting deductions and losses.

Molybdenum Deposit Reported Near Porthill, Idaho

Molybdenum ore is reported as being found in a 2-ft. fissure vein near Porthill, Idaho. The property is owned by Joe Wells and George Macy, and is 3 miles by trail from the Idaho-Continental road. About 40 tons of ore is said to be on the dump.

Mexican Conditions More Staple, Labor Plentiful at Sahuaripa, Sonora

Law and order are now reported to be enforced in Mexico. Life is safer, even in the mountain districts, than in the leading cities of the United States. Law functions in Mexico, and no maudlin sentiment nor complicated judicial procedure saves the bandit from facing the firing squad.

It will not be long before the railroad extends up the Rio Yaqui from Tonichi, its present terminus, and it will open up the great Sierra Madre country. Funds are available for the completion of a road from Sahuaripa, Sonora, to Tonichi, 50 miles to the westward. This will be done after the rainy season, which is on now with unusual force; the streams are booming; the fields and valleys are beautiful, and the ranges are finer than for many years. There is a large virgin area, but little prospected, at least 75 miles in length with surface showings of phenominally rich ores, specimens of free gold bedded in argentite not being rare. Farther southward, where copper is more in evidence, tetrahedrite contains or is associated with silver, always accompanied with some gold. The higher mountain mines of this district, the Chipiona and others, lie in a zone of rhyolite intrusion which is traceable northward to El Tigre, the most noted mine of precious metals of northern Mexico.

Plenty of good miners obtainable at $1.50@$2.50 (Mexican) per day, and there are opportunities now for mining men to secure valuable holdings.

Important Tin Discovery Reported Near El Oro, Mexico

There is considerable excitement in the El Oro district, in the State of Mexico, over a new tin discovery about 20 miles east of El Oro near the town of Acambay. Original locations have been made by H. C. Enos and associates, and work is being started on the principal vein at the discovery point.

The ore occurs as cassiterite disseminated through a vein or dike of rhyolitic porphyry carrying considerable quartz. It has a banded structure over a width of about 9 ft. and averages 3.5 per cent tin across this width. The wall rock is andesite. At the best spots pieces of cassiterite varying from ¼ to 3 in. in diameter occur, and these assay about 68 per cent tin. Experiments in smelting give a product 99.88 per cent fine. A peculiar feature is the occurrence of weathered cassiterite in the outcrop which retains its original kidney-shaped structure, but being so soft that it can be crushed in the hand.

Trinity Dredging Company Constructs New Dredge

The Trinity Dredging Co. is constructing a new dredge four miles from Lewiston, Calif., on the Trinity River. The old dredge which has been in use for a number of years will be continued in operation until replaced by the new one.

Melbourne Letter

By Peter G. Tait
Special Correspondent

American Fleet Visits Sydney and Melbourne

Labor Demanding Forty-Hour Week—Mining Commission Renders Report

Melbourne, July 24—Two events of outstanding importance are at the moment directing public attention to the United States of America. The first is the arrival this week of the large American naval fleet, half of which arrived in Sydney and the other half in Melbourne on July 23. Our American friends can rest assured that the fleet will receive a very cordial reception from all sections of the community. The other event is the flotation of a loan for $75,000,000 in New York. Cable reports state that the bonds were immediately taken up by investors. Simultaneously a smaller loan has been floated in London. The £20,000,000 so raised by the commonwealth is primarily on behalf of the states for reproductive works such as railways, bridges, roads and other public works. It may interest American readers to know that a local loan of £66,000,000 will be floated in Australia this year. This is a conversion loan in connection with war expenditure. Although the public debt of the commonwealth and the states totals nearly £1,000,000,000, a large portion of which was entirely due to the Great War, the resources of the country are so extensive that even the small population of about 6,000,000 people will not find it a staggering burden provided there is no undue extravagance by the various governments.

Forty-four-Hour Week Agitated

Unions throughout Australia are continuing to advocate a 44, and even 40-hour week. The agitation has gathered strength recently because of the fact that labor governments are now in power in five out of the six states. In the commonwealth parliament and the Victorian State Parliament the Nationalist or Liberal party is in power. Experience has demonstrated, however, that Labor in power is not so dangerous as many people imagine. The extreme socialistic section of the Labor party does not always get its own way. For instance, in Western Australia recently the engineers' union demanded a forty-four-hour week and the case was taken to the local Arbitration court, but the judge gave an award for the forty-eight-hour week for a period of three years. In Queensland, on the other hand, the forty-four-hour week is practically universal. The Mount Morgan Gold Mining Co., which has been losing money for the last three years, has recently had an award given against it, and in future the surface workers will work forty-four instead of forty-eight hours. The underground workers have been working forty-four hours for some time, and this new decision will probably mean that they will demand the forty-hour week. Mount Morgan, in Queensland, and Mount Lyell, in Tasmania, are practically the only copper mines working in Australia, and this decision threatens to close down Mount Morgan, as the directors have stated that they are not prepared to make any further concession. The metal manufacturers at Port Kembla depend on Mount Lyell and Mount Morgan for their supplies of copper, and if Mount Morgan closes down Australia may be compelled to import copper, as the Mount Lyell production would be insufficient for the requirements.

Improvements Needed at Kalgoorlie

The report of the Western Australian Mining Commission which was summarized in a recent issue naturally does not commend itself to the managers of the Kalgoorlie mines. It has, however, been known for some years that mining and treatment methods are in a rut. Instead of endeavoring to increase efficiency to meet rising costs, the policy of the mines has been to restrict output and to treat only ore that is profitable. Richard Hamilton, general manager of the Great Boulder and president of the Chamber of Mines, has attempted to prove that the output per man in Western Australia is higher than in South Africa, but with the large force of native and colored labor employed there at very much lower rates of pay, the comparison is not worth much. The fact is that a practical mining engineer like the commissioner (Kingsley Thomas) has expressed the opinion that both mining and treatment costs can be reduced by proper organization. Under present conditions the costs vary from 30s. to £2 2s. per ton, with an average of 36s. 6d., whereas Mr. Thomas considers that 25s. would be a fair average. It is evident from the report that the time is ripe for a thorough clean-up and reorganization on the Kalgoorlie field, and it remains to be seen whether the companies will take the necessary steps on their own initiative, or, failing that, what the government will do to stimulate their energies. A good deal will depend on the attitude of the London boards of directors. Under the circumstances it is unlikely that the government will give any heed to the request for a bonus on gold production at present.

The Australian Shale Oil Corporation has started mining operations at Latrobe, Tasmania, and the first distillation unit is expected to be completed in December. Although the development of Australian shale-oil deposits will be successfully accomplished in the long run, there are so many difficulties to be overcome that a large capital expenditure will be necessary.

Amalgamated Zinc, which has received large concessions from the Tasmanian Government in connection with the proposed manufacture of newsprint paper from local timber, recently asked the Tariff Board for an assurance that a protective duty of 40 per cent would be given to it and that in the meantime pending the full establishment of the industry it should be awarded a bonus on production. It was stated in fairly clear terms that unless this support is forthcoming the industry will not be established.

London Letter

By W. A. Doman
Special Correspondent

Feldtmann Resigns from Ashanti Goldfields—Interest Aroused in Tin Mining

London, Aug. 18.—Considerable surprise was expressed in mining circles when it became known that W. R. Feldtmann, consulting engineer to the Ashanti Goldfields Corporation, had resigned his position. Mr. Feldtmann had come to be almost known as the Ashanti Goldfields, and no one could think of the company without associating his name with it. In reality it was he who was largely responsible for making the mine a success. No one has ever impugned his ability or his management; certainly no man could have devoted more time and attention to his duties. In confirmation of this, it may be mentioned that he has made no fewer than forty trips to West Africa, which must be almost a record for a mining engineer. Technical men now are inquiring the reason for the resignation. No official statement beyond the bare fact has been made, which allows surmise to have full play. One suggestion is that he prefers to give up the Gold Coast. Another is that he does not see eye to eye with the directors in regard to the method of ore treatment. It will be remembered that there was a change some months ago, and great interest was manifested in the outcome. This has not been altogether satisfactory. Mr. Feldtmann will be succeeded by J. S. Watkins, who was chief metallurgist from 1905 to 1911 and mine manager from 1911 to 1920. There is no suggestion of Mr. Feldtmann retiring from business. Quite recently he paid a visit to the South West Protectorate, and also to the Transvaal, and the belief is that his ability will find an outlet in connection with a South African property. While in South West Africa he made a trip to the Ranga Tin Syndicate's area, and met Trewartha James, who is there on behalf of the syndicate. It is said that an important project is pending.

Ranga Tin Area Reported Rich

Although nothing official is known, rumor has it that the owners of neighboring ground—Germans—are willing to amalgamate if satisfactory terms can be arranged. The Ranga area is reported to be rich in tin, but I believe there is not an abundance of water.

The death is announced of Arthur Richard Campion, the discoverer of the Cam & Motor mine. He made his first visit to Rhodesia about a quarter of a century ago and was one of the greatest authorities on mining in that country. Private advices from Rhodesia are to the effect that it is highly mineralized, and that a big base-metal industry will be built up. Apropos of base metals it is announced that the Falcon Mines, a copper and gold producer, which has been under the management of the Consolidated Goldfields, is to close down at the end of August owing to exhaustion of reserves.

Societies, Addresses, and Reports

Mutual Confidence Needed to Solve Zinc Industries' Internal Problems

S. S. Tuthill Wants to Forego "Jockeying"—Plain Talk in Bulletin of Zinc Institute

S. S. TUTHILL, who incorporated the American Zinc Institute seven years ago and who has served as secretary ever since, uses plain language in urging the mining and smelting interests of the Joplin-Miami district to reach a better basis of co-operation. The following is from an editorial that will appear in the August-September issue of the Bulletin of the Institute:

When the zinc men of this country decided in 1918 to bridge the chasms separating the mining and the smelting and the rolling branches of their industry, they clearly intended that the roadway over those bridges, which they named "co-operation" and "co-ordination," should serve them in all things pertaining to their industry. It is true that this roadway has served them well on many occasions, but it is equally true that some of the members of the Institute have failed to avail themselves of the opportunities which the Institute has always afforded for a better understanding among its members.

A recapitulation of the activities of the Institute in behalf of the industry which it was created to serve as a whole should not be necessary at this time. A few outstanding accomplishments will suffice.

(1) There has been built up throughout the industry an acquaintanceship with one another,—the first necessary step in any co-operative effort.

(2) Zinc has become assertively known as zinc throughout the land.

(3) Monthly slab zinc statistics, which have become of great value to the industry and consumers alike.

(4) A tariff schedule that was sought and granted on the ground of protection to American labor in every branch of the American zinc industry.

(5) Negotiations are pending in respect to a proposed drastic change of policy by some of the largest users of zinc that otherwise would have never become known until great damage had been done to the zinc industry.

But the removal of the causes of disagreement between the sellers and the buyers of Joplin-Miami zinc ore has not yet been accomplished.

After considerable preparatory work, a representative committee of three mining men and three smelting men was appointed at the 1925 annual meeting of the Institute to solve this problem.

Three months have passed since that committee was appointed, and the net result of its work has been a call for "more information."

The principal work of this committee is the creation of a spirit of mutual confidence among the members of the mining and smelting branches of the industry, and until such a spirit prevails any information that may be submitted will be worthless.

Has not the time come for the two branches of the industry involved in this matter to make up their minds that the square deal must prevail without further jockeying, or, if not, for the tearing up of all codes of ethics and the putting of the rule of the "survival of the fittest" into full play?

Each side to this controversy professes that the other should have a fair profit.

The only way to learn what is a fair profit is for each side to agree to submit and receive in good faith the average mining and smelting costs and selling prices as the basis for a fair rule of adjustment, or an ore schedule.

With this agreement in hand, and before proceeding further, the legality of the proposed arrangement would be submitted to the Attorney General of the United States, who has expressed a willingness to pass upon the legality of any proposed trade association activity.

First of all, however, the members of the zinc industry must establish among themselves an earnest desire to co-operate through their Institute in all matters pertaining to their industry. That can only be done by discarding the tactics of the past and the squaring of their actions with the knowledge that the foundation of business is confidence, which springs from integrity, fair dealing, efficient service, and mutual benefit.

All your strength is in union;
All your danger is in discord;
Therefore be at peace henceforward,
And as brothers live together.
—*Longfellow.*

Middle West Engineers Have International Convention in Winnipeg

More than 200 engineers accepted the invitation of Mayor Ralph Webb for an international "Get Together" convention of all the architects and engineering societies of Minnesota, the Dakotas, Iowa, and Manitoba held in Winnipeg on Aug. 20 and 21. The convention completely erased the border line between Canada and the United States and the meeting was a real international affair.

On Aug. 21 the party, as guests of the city of Winnipeg, were taken to Pointe Du Bois to inspect the municipal hydro-electric plant located on the Winnipeg River. This plant has an installation of 90,000 hp. and retails electricity to the city at 3c. per kw.-hr. for lighting and 0.9c. for cooking. This is one of the lowest rates of any city in America. The mining possibilities of the province were explained, covering gold, silver, and copper as well as building stone.

Columbia Section A.I.M.E. Will Meet H. Foster Bain Sept. 25

A meeting of the Columbia section of the A.I.M.E. will be held at Wallace, Idaho, on Sept. 25. The engineers will arrive in the forenoon, and the afternoon will be spent in visiting the mines and mills at Mullan and Burke. A dinner will be served in the evening, following which will be the technical and business session. Dr. H. Foster Bain, of New York, secretary of the A.I.M.E., will be present and address the meeting. Announcement is also made that a paper on "Banded Structure of Ores" will be read by Dr. F. B. Laney, head of the department of geology at the School of Mines, University of Idaho.

Invitations have been extended to members of Montana, Oregon, Puget Sound and British Columbia sections to attend the Wallace meeting. and it is expected that those sections will be well represented. The Columbia section includes northern Idaho and eastern Washington. Rowland King, of Spokane, is chairman; Harry W. Marsh, of Wallace, Idaho, is vice-chairman, and L. K. Armstrong, of Spokane, is secretary. The day following the meeting in Wallace the engineers will go to Kellogg and inspect the Bunker Hill & Sullivan mine, mills and smelter.

A. A. Bawden New Chairman of L. S. M. S. National Safety Council

At the closing session of the two-day conference—Aug. 25 and 26—of the Lake Superior Mining Section of the National Safety Council, A. A. Bawden, of Ironwood, Mich., safety inspector for the Gogebic Range, was elected chairman. The following were named directors: B. J. Shore, Ironwood; L. E. Peterson, Hurley; W. H. Carrick, Bessemer, and Theodore Roy, Ironwood.

Two hundred engineers, mine captains, and executives attended the meeting, which was held at the Hibbing, Minn., high school.

Among the papers were the following: "Stray Currents," by A. J. Herman, electrical engineer, Oliver Iron Mining Co.; "Underground Haulage," by Anton Tancig, mechanical superintendent, Shenango Furnace Co., Chisholm, Minn., and Lucien Eaton, superintendent, Cleveland-Cliffs Iron Co., Ishpeming, Mich.; "Some Safety Practices in Metal Mines of the West," by F. C. Gregory; and "Use of Goggles at Metal Mines," by C. A. Kingsbury.

Mining Congress at Phoenix Nov. 16

The Phoenix meeting of the American Mining Congress will be held Nov. 16 to 19. The gatherings of the first two days will be held at the San Marcos Hotel, in Chandler, Ariz. On Aug. 18 the party will go to Globe-Miami, and the following day will be spent in visiting various points of interest in that district.

Recent Technical Publications

Reviews, Abstracts, and References

The Physical Chemistry of Igneous Rock Formation. A General Discussion. Faraday Society, 90 Great Russell St., W. C. 1, London. October, 1924. Eighty-seven pages. Price 6s. 6d. net.

This is the result of a symposium held by the Faraday Society, the Geological Society, and the Mineralogical Society in October, 1924, and contains many short papers, constituting altogether a series of great interest. Short papers were presented by Messrs. Flett, Tyrrell, Niggli, Richardson, Gregory, Evans, Desch, Turner, Hallimond, and Scott, with interesting discussions by many others. The effect is to put before the reader the problem from many points of view; if he fails to find the exact and finished state of the science which he had hoped and which he might have assumed from perusing any one of the authors who have written on the subject, the result nevertheless will be helpful and inspiring. Indeed, the general spirit was to point out the problems to be solved, the factors involved, and urge further research. It was a forward-looking rather than a self-satisfied symposium. The humble status of the science was thus expressed by Mr. Cosmo Johns: "The physico-chemical history of our igneous rocks, as at present understood, is largely a matter of doubtful interest from a meager collection of facts."

The student of ore deposits, no less than other geologists, will do well to acquire and study this pamphlet, which while being sketchy, covers so wide a field. It is of course far from comprehensive, for many well-known phases of the physical chemistry of magmas are untouched; but it can well be studied and kept for reference.

J. E. SPURR.

Utah Mining—"Marysvale's Mineral Resources," by Josiah F. Gibbs of Marysvale, Utah, has been published by the author and other mining men of the district as a means of both giving dependable information concerning the geology and history of the camp as well as enlisting the interest of outside capital. In the past, the booklet states, the chief drawbacks to the successful exploitation of the district's wealth have been structural conditions; the almost universal misconception of the camp's geology; lack of deep development, which has not entitled the region to more than superficial examination on the part of the United States Geological Survey; isolation of the camp; and promotion enterprises of unscrupulous operators. The pamphlet is illustrated with relief and other maps. Each of the areas of the district, as well as each of the mines, is described in special subdivisions.

Quicksilver—Bulletin 222 of the Bureau of Mines is entitled "The Metallurgy of Quicksilver," written by L. H. Duschak and C. N. Schuette. It contains 173 pages and is a comprehensive treatise on the subject. After discussing the behavior of quicksilver ores in roasting and their preliminary treatment, as well as the subjects of sampling and assaying, the authors give sixty pages or more to a description of the various types of furnaces used. The recovery of mercury from furnace gases in then taken up, followed by a brief description of retort furnaces. Concentration and wet treatment of quicksilver ores are treated in a ten-page section. The bulletin concludes with a discussion of the health hazards involved in extracting quicksilver, this followed by a selected bibliography. It is well illustrated.

The Hecla Mine—An article of four pages in the *Compressed Air Magazine* for September contains a description of the Hecla mine, at Burke. It is written by Walter E. Carr and is well illustrated. A novel and efficient manner of changing cages in a two-compartment shaft is featured.

Tin—*The Mining Magazine* for August contains two articles on tin. One of these, entitled the "Nigerian Tin Deposits," by W. R. Rumboldt and R. H. Johnson, is based on notes originally compiled for the benefit of a party of business men who recently visited the Nigerian tin fields. The article is concise and comprehensive. The second is entitled "Tin Deposits of Kinta," by William R. Jones. This article is the final reply of the author in a discussion between W. E. Cameron and himself as to the geology of the Kinta Valley, which is in the Federated Malay States.

Platinum—A short article in *The Mining Magazine* for August discusses the platinum-bearing rocks of the Lizard district, in Cornwall. The writer is E. H. Davison, who says that there is no certainty that payable deposits will be found in this area, but that there are possibilities. He suggests that prospecting of the area be undertaken in the near future.

Limestone—Bulletin 247 of the Bureau of Mines is entitled "Sources of Limestone, Gypsum, and Anhydrite for Dusting Coal Mines to Prevent Explosions." It contains 70 pages and several insert maps. The author is Oliver Bowles. As he invariably does, Dr. Bowles treats his subject in a very thorough and able manner. The subject is of interest to those metal mining companies which have adopted or may find it desirable to adopt rock dusting.

Oil Shale—The Kentucky Geological Survey, Frankfort, Ky., has issued an attractive book of 242 pages on the subject of "The Oil Shales of Kentucky." It consists of a series of four economic and morphological discussions of the Devonian shales of the state by Reinhardt Thiessen, David White, and Charles Stevens Crouse. With it are included three separate geological papers by Arthur McQuiston Miller, Walter H. Bucher, and Mr. Crouse. It is illustrated with 64 photographs, maps and diagrams. The director and State Geologist, W. R. Jillson, says that in the last few years a growing interest has been evinced in the lithological character and commercial possibilities of the black Devonian oil shales of the state. The discussions have been so arranged as to answer the most important questions of the present time and may be regarded as a sequel to Dr. Jillson's "Preliminary Report on the Oil Shales of Kentucky" which the State Survey issued in 1921.

Mineral Resources—A summary report of the "Mineral Resources of the United States in 1924" has been issued by the Geological Survey. It contains 108 pages, with an introduction by Frank J. Katz. The statistics given have been assembled by Martha B. Clark from data furnished by the Division of Mineral Resources.

Patents

Smelting—No. 1,550,655. Aug. 25, 1925. John Owen Ambler, H. H. Stout, and Spencer Bishop, Clifton, Ariz., assignors to Phelps Dodge Corporation, New York. A method of operating an ore smelting furnace, and the apparatus therefor.

Petroleum—No. 1,550,963. Aug. 25, 1925. Ralph M. Jackson, La Habra, Calif. A deep well oil pump.

Compressors — No. 1,550,970. Aug. 25, 1925. Maylon La Quay, Battle Creek, Mich. A lubricator for multi-stage compressors.

Vanadium—No. 1,550,998. Aug. 25, 1925. Albert Wittig, Berlin, Germany. A method of producing metallic vanadium from its compounds.

Rock Drill—No. 1,551,062. Aug. 25, 1925. Fred M. Slater, Easton, Pa., assignor to Ingersoll-Rand Co., Jersey City, N. J. A rock drill of the hammer type.

Rock Drill—No. 1,551,096. Aug. 25, 1925. Elmer G. Gartin, Claremont, N. H., assignor to Sullivan Machinery Co., Chicago. A chuck mechanism for drilling devices.

Rock Drill—No. 1,551,098. Aug. 25, 1925. George H. Gilman. Boston, Mass., assignor to Sullivan Machinery Co., Chicago. A rock drill of the reciprocating type.

Surveying—No. 1,551.182. Aug. 25, 1925. John Vennetta, Warren, Ohio.

Furnace — No. 1,551,180. Aug. 25, 1925. Edwin B. Thornhill, Hurley, N. M., assignor to Thornhill-Anderson Co., Muskogee, Okla. A furnace with heating elements arranged for heating by radiation.

Furnace — No. 1,551,396. Aug. 25, 1925. Carl. L. Ipsen, Schenectady, N.Y., assignor to General Electric Co. An electric furnace with carbonaceous electrodes.

Electrostatic Separation—No. 1,551,-397. Aug. 25, 1925. Fred R. Johnson, Arlington, Mass., assignor to Huff Electrostatic Separator Co., Arlington, Mass. The art of electrostatic separation of unlike particles from ground material of different kinds moving over a charged surface.

Furnace — No. 1,551,424. Aug. 25, 1925. Joshua Norrish, San Francisco, Calif. A furnace with a vertical cylindrical roaster through which the material to be roasted flows by gravity.

People You Should Know About

© Harris & Ewing
Miss Mary M. O'Reilly

Miss Mary M. O'Reilly will continue as assistant director of the Bureau of the Mint, a place she has held for nearly a quarter of a century. She can have a place which pays double the salary and which would remove her from the cloistered confines of the Mint Bureau and thrust her far out in the limelight, but she chooses to stick to her specialty. She has become one of the country's great authorities on coinage, on the procurement of gold and silver bullion, and on the business side of minting operations. Miss O'Reilly is in immediate charge of the technical work of the Bureau and for a considerable period each year is its acting director. When Mrs. Helen H. Gardener, of the Civil Service Commission, died recently, there was a spontaneous movement which had as its object the sweeping of Miss O'Reilly into the vacancy. In fact, the effort got well under way before Miss O'Reilly was consulted. When the matter was taken up with her, she declined to allow her name to go to the White House. She had to be rather abrupt in the declination, as she was in the midst of winding up the compilation of gold and silver purchases for the last year and had to discourage the movement without losing much time. As a result, the present generation of gold and silver producers will continue to correspond with Miss O'Reilly, as did their fathers before them.

Dr. Morrow Campbell has returned to Australia from Burmah.

E. J. Carlisle, metallurgist of Los Angeles, is visiting in San Francisco.

Victor G. Hills, mining engineer, is examining a mine near Neihart, Mont.

Charles A. Austin, of the Phelps Dodge Corporation, has returned from Europe.

Hamilton Brush, vice-president of the American Smelting & Refining Co., is taking a vacation in the Adirondacks.

D. C. Jackling and party have returned from their Alaskan trip, which included a visit to the Kennecott property.

H. H. Whitelock Boyes is on his way from Australia to Nigeria to take over the management of the Kwapa Tin Mines.

E. T. McCarthy has left London on his way to the Malay States; from there he will probably go to Korea, returning home by way of San Francisco.

Cyril Parsons will shortly proceed from Australia to the Gold Coast, Africa, to look after the Kibbi property—a gold reef area—of the Akim company, where work is now proceeding.

J. V. N. Dorr, president of The Dorr Co., arrived in New York on the "Olympic," Aug. 26, after spending two and one-half months in Europe in connection with European business of the company.

H. C. Smith is resident manager of the Allenby Copper Co., Ltd., property, at Allenby, B. C., and **H. R. Taylor** is superintendent of the Allenby mill. The report in our Aug. 15 issue, that Mr. Smith was in charge of the company mill, was incorrect.

Dr. H. I. Jensen, Australian geologist, has returned to Sydney from a tour of investigation in the mandated territory of New Guinea, made on behalf of the Ormildah Oil Development Co., Ltd. He recommended boring in the Marienburg district, where the company has secured an option.

Dr. J. A. Allan, professor of geology in the University of Alberta, and his assistant, **P. L. Lamb,** who were making investigations along the Saskatchewan River in the foothills of the Rocky Mountains, had a narrow escape with their lives recently when their boat upset and their outfit was lost.

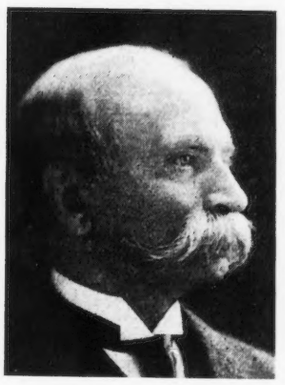
G. N. Helling has been engaged by the American Metal Co. as engineer of mines and will take charge of one of the company's properties at Huehuetenango, Guatemala. The mines are lead producers. **Louis Garbrecht** is manager in charge of all the company's operations in Guatemala.

Obituary

Harry B. Iseman, a well-known mining man of the Yukon, and manager of the Klondyke Mines Railway, was drowned on Aug. 2 while making an inspection trip to a reported new gold strike in the Pelly River district. The body was not recovered at the time but was found later by a hunting party. Until recently Mr. Iseman was associated with the New Northwest Corporation, representing English capital. He leaves a widow.

Thomas Lyons, discoverer of the Mount Lyons tin mine, Mount Balfour, Tasmania, and uncle of the premier of that state, died recently in Australia. Mr. Lyons had lived practically all his life at Stanley, where he passed away. He prospected the Mount Balfour district persistently until tin was discovered about forty years ago. The discovery of copper followed, and he could have sold out for a large sum, twelve years or so ago, but his faith in the district remained to the end, when only a few residents were left.

Dr. Charles Frederick Chandler, educator, public health crusader, and world-renowned chemist, died in Hartford, Conn., on Aug. 25, at the age of eighty-eight. He had been an instructor at Columbia for forty-six years, and was largely instrumental in bringing into being the School of Mines of that university. Dr. Chandler was born at Lancaster, Mass., his ancestors being among the first English settlers in New England. He was educated at Lawrence Scientific School of Harvard University and at the universities of Goettingen and Berlin. He became assistant professor in chemistry at Union College in 1857, and soon thereafter attained a full professorship. In 1864 he came to New York, since which time he has been closely identified with the educational activities and welfare of the metropolis, taking a conspicuous and able leadership in scientific investigations and sanitary reform affecting control of contagious diseases, plumbing, sewers, the construction of tenement houses, and the regulation of slaughter houses and markets. Dr. Chandler was a great scientist—and a humanitarian who gave unstintingly of time and service, not alone to the vicinity in which he lived, but to the many scientific and civic associations in which he held membership. He devised the system of weights now used generally in assaying precious metals, was prominent in founding the American Chemical Society, of which he was several times president, and was also president of the Chemists' Club, of the Street Cleaning Improvement Society, of the State Charities Aid Association, and was associated with many other scientific and civic organizations. In 1920 he was awarded the Perkin Gold



Dr. C. F. Chandler

Medal by the Society of Chemical Foundations, for his notable scientific attainments. An enthusiastic idealist and an indefatigable worker, Dr. Chandler lived to realize the many practical objectives the attainment of which, for a long span of years, had been his life's purpose and aim. He numbered his friends literally by the thousands—among them many mining engineers who had been under his instruction in chemistry. His contributions to science and education are a permanent heritage.

New Machinery and Inventions

Recording Pyrometer Has Several New Features

A new recording pyrometer that combines with accuracy various desirable features has been developed in the last five years by the Brown Instrument Co., Philadelphia, Pa. Some of the features are radically new and patents have been applied for covering them.

The new recorder has a die-cast black enameled aluminum case. It is 15 in. high, 14 in. wide and 9 in. deep, requiring a minimum amount of wall space considering the unusually wide (7 in.) chart. It is built to make a single record, a duplex record with two records side by side, or in multiple form produces as many as twelve records on one chart.

It operates on the frictionless principle, in which a pointer swings freely and at intervals of every thirty seconds is depressed on a carbon or inked ribbon, producing a mark on the chart. These marks are so close together as to form a continuous line. The marking ribbon and chart last two months before renewal is required, and no inking is necessary.

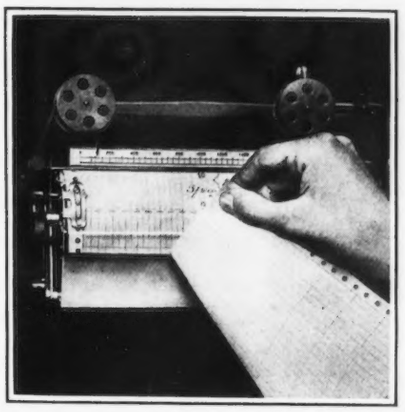
The marking ribbon is above the paper, hence the mark is produced on the front side of the paper, where it shows clearly. The marking ribbon in the single and duplex recorder after each mark on the chart is moved back, disclosing the last impression, hence the record is clearly visible immediately after it is produced.

A platen is supplied on which notes can be recorded on the chart with pen or pencil. A glass knife edge is furnished for tearing off the paper and is located directly below the driving roll. The paper can be torn off two hours after the last impression is made. For example, a complete record for the previous twenty-four hours and ending 6 a.m. can be torn off about 8 a.m.

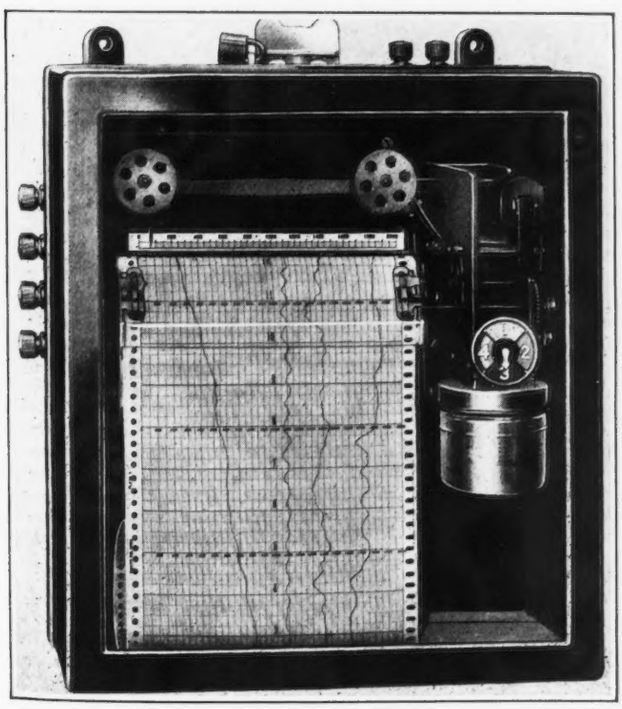
The galvanometer and the recording chart mechanism are carried on a hinged frame. When swung aside, the galvanometer is instantly accessible, and when closed a housing protects it.

In addition to recording the temperature on the chart, an indicating scale is provided with large figures legible at a considerable distance. The chart has rectangular co-ordinates. The time lines are straight across the chart and not curved as in other instruments.

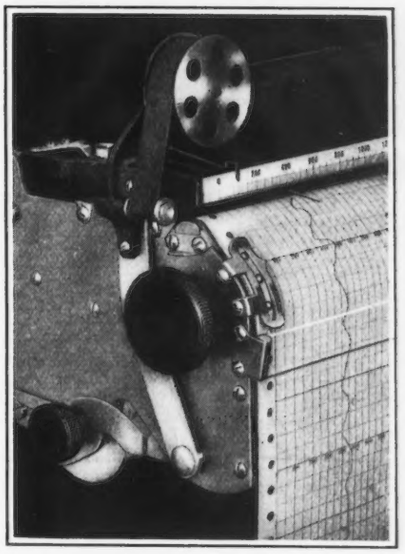
The recorder is driven by an electric clock consuming 4 watts, if alternating current is available. The clock eliminates hand winding and no governor or other means is needed to secure accurate timing. Where alternating current is not available, a hand-wound clock can be supplied.



A glass knife edge makes it easy to tear off the chart



Various new features are combined with accuracy in this new recording pyrometer. It has no solenoids, no motors. The chart lasts two months.



The marking ribbon has been moved back to make the record visible

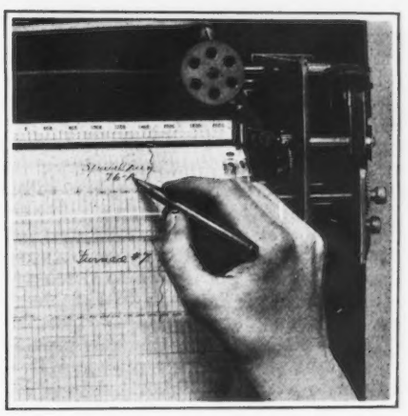
The chart speed can readily be changed and is supplied for a number of combinations. The standard chart speed is 1 in. an hour, but by reversing two gears a speed of 4 in. an hour is obtainable. Speed combinations are available from ¼ in. an hour to 6 in. an hour.

With a standard chart speed of 1 in. an hour, about twelve hours of chart is visible through the front of the case.

The instrument as a pyrometer incorporates automatic cold junction compensation, including the Brown patented index for adjusting a compensated pyrometer to the correct initial starting point on open circuit.

A re-roll attachment is furnished where desired to roll up the chart automatically over a long period of time.

As a multiple recorder, this instrument incorporates an automatic switch with gold contacts mounted on Bakelite and immersed in oil, which prevents any possibility of tarnishing of the contacts from corrosive gases in the atmosphere. The multiple recorder switch includes a dial with index for indicating the number of the thermocouple or furnace that is being recorded at the time. The record lines are made

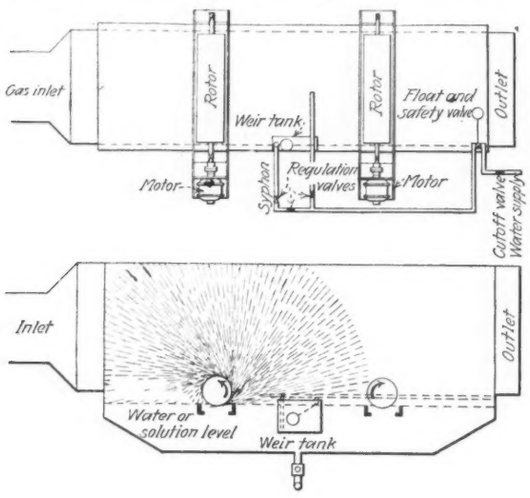


Support is provided for the hand when writing notes on chart

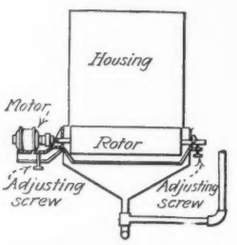
in different color combinations on the chart and the switch dial is numbered and colored to correspond. The instrument has no solenoids, no motors requiring governors for speed control, no hand winding where the electric clock is used, no inking of pen, and no frequent renewal of chart, which lasts two months. This recording instrument marks a step forward in the development of instruments for measuring temperature, electricity, speed and gases.

Light Portable Equipment for Drilling

A two-cylinder 8-hp. Cushman engine direct-connected to a non-exhaust air compressor, together with a pulsating type of hammer air drill, is a combination that has been introduced by the Cushman Motor Works, Lincoln, Neb. Its weight is only 950 lb. complete, but it is said to deliver forceful hammer blows.



Insoluble dusts may be recovered from air coming from grinding, calcining or drying machines by means of this device.



Spraying Machine for Dust Collecting

In the accompanying illustration is shown a piece of equipment that has been used successfully for recovering non-soluble dusts from air coming from grinding, calcining, or drying machines. It is known as the Christensen tangential spray machine and is made by the Hardinge Co., York, Pa. In its operation, smooth surfaced rotors, running at high speed, throw off a continuous shower of small particles of water, or other liquid, which wet the dust particles to be collected. The lower part of the rotor dips in the water or whatever the liquid may be.

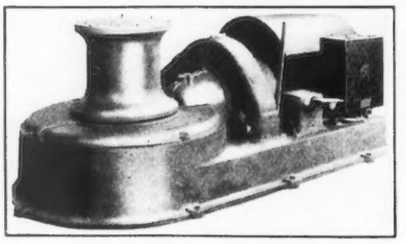
The essential features of the apparatus may be duplicated as required. A double rotor unit is shown in the drawing. Referring to this, the operation is as follows: The gas or air loaded with fine particles that it is desired to remove, passes into the chamber over the rotors. The bottom of this chamber forms the bath into which the rotors dip. The liquid level in this bath is maintained at a constant, predetermined point by a regulating valve and a check float valve.

The rotors are each connected directly to a ½-hp. motor running at 875 r.p.m. The level of these rotors can be adjusted by screws. If the dust is soluble, a continuous overflow of concentrated liquor may be obtained by arranging a gooseneck to discharge on a level with the bath in the chamber. Intermittent discharge is possible by maintaining the gooseneck pipe in an upright position except when it is desired to withdraw liquor. A modified form of apparatus has been used successfully for the recovery of non-soluble dusts from air from grinding, calcining or drying machines.

New Car Puller Noiseless —Operated Electrically

For moving and spotting cars where no switch engine is available, the Clyde Iron Works, Duluth, Minn., has recently put an electric capstan car puller on the market. The equipment consists of a vertical winch-head bolted direct to a bevel gear, driven by an electric motor through two sets of intermediate gearing and a bevel pinion. The unit is completely inclosed in a semi-steel housing so as to be dustproof and weatherproof, which insures a longer life for equipment of this sort which is exposed continually to the weather.

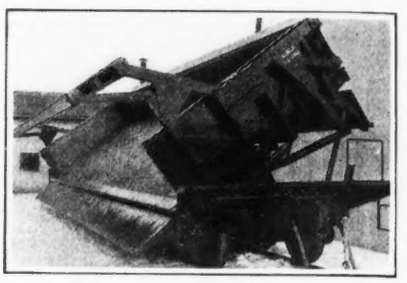
All of the gears run in a bath of oil, and the Alemite greasing system is provided throughout. It is claimed that the bakelite micarta motor pinion makes operation practically noiseless. Operation is controlled by a push button arranged for foot control. Overload and low voltage protection is provided. These car pullers are built in three sizes, with 5-, 10- and 15-hp. motors developing pulls of 3,000 lb., 6,000 lb. and 10,000 lb. respectively at a line speed of approximately 40 ft. per minute.



This car puller is said to be noiseless, its gears running in oil. Forced lubrication is provided

Improved Air Dump Cars Introduced

To make more efficient use of steam shovels and other loading machinery, as well as to make possible the movement of greater quantities of material with the least possible interference with traffic, the Magor Car Corp., New York City, has developed an air dump car of 30-yd. water-level capacity. The car is built throughout of steel and with the body of such dimensions as will allow of 4 yd. of material being loaded without extra top boards. Dump cars of 20 yd. and 12 yd. capacity of the same



Dumping of this new car is controlled by valves under the platforms, which are turned by hand rods, obviating risk of accident

general design are also manufactured. Lifting doors that operate mechanically when the car is dumped serve to discharge the load clear of track and ballast. Extension chutes may be provided if desired. Since these chutes may be withdrawn from under the dump load, the work train is allowed to move promptly without waiting for part of the load to be hand-shoveled away from the train. The clearance between lifted door and floor is 5 ft. 2 in., which is sufficient to clear practically any load handled by a steam shovel.

The dumping cylinders are operated by air passing through special valves which are in turn operated by selective 3-way valves in each air line. These 3-way valves are located under the end platform of the car and controlled by hand rods so as to permit of complete control by the operator without risk of accident. Air may be supplied direct from the locomotive or from a steel reservoir either in the train or in individual cars.

These cars have an over-all length of 38 ft. 2 in. and an over-all width of 10 ft. 1¾ in. Inside dimensions of the car body are 34 ft. by 8 ft. 11¼ in. by 2 ft. 8 in. The floor is of $\frac{5}{16}$-in. steel plate reinforced by 2¾-in. oak planking to absorb shock. One of the new improvements consists of positive compression locks. These maintain the body in a firm position while in transit, and prevent the dumping of the body except when required. The compression lock is constructed of heavy steel castings automatically operated when the car body is released but firmly fixed when the car is upright.

Palmyra, Not Elmira!

In a recent issue the address of the Garlock Packing Co. was given as Elmira, N. Y. The correct address is Palmyra, N. Y.

The Market Report

Daily Prices of Metals

Aug. Sept.	Copper N. Y. net refinery*	Tin		Lead		Zinc
	Electrolytic	99 Per Cent	Straits	N.Y.	St. L.	St. L.
27	14.50@14.625	55.75	57.25	9.50	9.50@9.75	7 60
28	14 50	55.75	57.25	9.50	9.50@9.75	7.575@7.60
29	14.375@14.50	55.625	57.125	9.50	9.60	7.575
31	14.35	55.25	56.625@56.75	9.60	9.65	7.575
1	14.30@14.35	54.875	56.50	9.50	9.60	7.55@7.575
2	14.375	55.00	56.625	9.50	9.50@9.60	7.575
Av.	14.425	55.375	56.906	9.517	9.608	7.579

*The prices correspond to the following quotations for copper delivered: Aug. 27, 14.75@14.875c.; Aug. 28, 14.75c.; Aug. 29, 14.625@14.75c.; Aug. 31, 14.60c.; Sept. 1, 14.55@14.60c.; Sept. 2, 14.625c.

The above quotations are our appraisal of the average of the major markets based generally on sales as made and reported by producers and agencies, and represent to the best of our judgment the prevailing values of the metals for deliveries constituting the major markets, reduced to the basis of New York cash, except where St. Louis is the normal basing point, or as otherwise noted. All prices are in cents per pound. Copper is commonly sold "delivered," which means that the seller pays the freight from the refinery to the buyer's destination.

Quotations for copper are for ordinary forms of wire bars, ingot bars and cakes. For ingots an extra of 0.05c. per lb. is charged and there are other extras for other shapes. Cathodes are sold at a discount of 0.125c. per lb.

Quotations for zinc are for ordinary Prime Western brands. Quotations for lead reflect prices obtained for common lead, and do not include grades on which a premium is asked.

The quotations are arrived at by a committee consisting of the market editors of *Mining Journal-Press* and a special representative of the Bureau of Mines and the Bureau of Foreign and Domestic Commerce.

London

Aug. Sept.	Copper			Tin		Lead		Zinc	
	Standard		Electrolytic						
	Spot	3M		Spot	3M	Spot	3M	Spot	3M
27	62 1/8	63 1/8	67 3/4	254 1/2	257 1/2	39 3/8	37 1/8	36 7/8	36 3/8
28	62	63	67 1/4	253 3/8	256 1/2	39	36 13/16	36 13/16	36 5/16
31	61 3/4	62 3/4	67 1/4	251 7/8	254 7/8	38 7/8	36 15/16	36 13/16	36 1/16
1	61 5/8	62 5/8	67	250 1/4	253 1/8	38 3/4	36 7/8	36 1/2	35 13/16
2	61 3/4	62 3/4	67 1/4	251 1/8	254 1/4	38 3/8	36 1/2	36 11/16	35 15/16

The above table gives the closing quotations on the London Metal Exchange. All prices in pounds sterling per ton of 2,240 lb.

Silver, Gold, and Sterling Exchange

Aug.	Sterling Exchange "Checks"	Silver		Gold London	Aug. Sept.	Sterling Exchange "Checks"	Silver		Gold London
		New York	London				New York	London	
27	4.85 1/4	71 1/4	32 5/8	84s11 1/2d	31	4.85 1/8	71 3/4	32 7/8	84s11 1/2d
28	4.85 1/8	70 7/8	32 9/16	84s11 1/2d	1	4.85	71 5/8	32 7/8	84s10 1/2d
29	4.85 1/8	71 1/4	32 13/16	.....	2	4.85	71 3/4	32 7/8	84s10 1/2d

New York quotations are as reported by Handy & Harman and are in cents per troy ounce of bar silver, 999 fine. London silver quotations are in pence per troy ounce of sterling silver, 925 fine. Sterling quotations represent the demand market in the forenoon. Cables command three-eighths cent premium.

Average Metal Prices for August, 1925

Copper:	
New York Electrolytic	14.490
London Standard	62.613
London Electrolytic	68.169
Lead:	
New York	9.192
St. Louis	9.284
London	38.188
Silver:	
New York	70.240
London	32.268
Sterling Exchange	485.264
Zinc:	
St. Louis	7.576
London	36.691
London Forward	36.219
Tin:	
99 per cent	56.649
Straits	58.190
London	258.538
Quicksilver	82.317
Antimony	17.683
Platinum:	
Refined	120.000
Crude	113.538
Aluminum, 99 per cent	27.000

Metal Markets Stagnant, With Prices Somewhat Lower

New York, Sept. 2, 1925—The principal non-ferrous metal markets were dull verging on stagnation during the week ending today. Dealers and speculative traders rather than producers dominated the markets generally. The situation in copper is brighter however. A good volume of business at 14⅜c. delivered has been done today, but the gross sales for the week are measurably less than the comparatively low record of last week. Lead is firm though quiet, and the "outside" prices are about on a par with those of the leading factors. Zinc declined slightly, probably in sympathy with tin and copper. The tin market is dull, both here and abroad. Silver remains quiet, the quotation of Aug. 31, 71⅞c., establishing the third high record in as many weeks.

Producers Out of Copper Market

With one or two exceptions copper producers are not in the market at the prevailing figure of 14⅜c. delivered. Some copper was sold last Thursday at 14⅞c., but since then consumers have been able to get what they wanted at a materially lower figure, sales being made on Monday at as low as 14.55c. delivered. These were in comparatively small tonnages, being resale lots for the most part. The market in Europe has suffered from liquidation and probably as a result of arbitrage transactions made profitable by the unusually wide spread between standard and electrolytic on the London Exchange. This has been reflected on this side.

The attitude of one very important consumer is that the producers can supply at a good profit to themselves all the copper that the world needs at between 14½c. and 15c. per lb. Accordingly, he is not in the market when asking prices are around 15c. Producers, on the other hand, are fairly well sold for September and are confident that a reaction will follow after Labor Day. The statistical position remains excellent and a further decrease in stocks of refined metal is expected. The actual stocks at all but one of the eastern seaboard refineries are greatly depleted and deliveries are being made from current daily output.

Some domestic producers are holding at 14.95c. to 15.05c., c.i.f., for foreign shipment, but quite naturally are doing no business. Offers of 14.55c. f.a.s. for September and 14.65c. for October-November deliveries are above buyers' ideas for consignment abroad.

Lead at 9.50c.

The American Smelting & Refining Co. has maintained its official contract price at 9.50c. all the week. Some small sales of premium metal were recorded, but the requirements for spot metal are not urgent. In St. Louis re-sale lots that were held above 10c. a week or two ago are now being pressed on the market at a much lower

figure. While 9.75c. was realized on good tonnages last Thursday and Friday, the market seems to be close to 9.50c. today for September and October positions alike. It appears that some September metal is still available, through not in large quantities. Consumers, on the other hand, are generally well supplied through September. The London market is still dull, but ore lead cannot be retained in the domestic market except in comparison with future positions, abroad. Corroding lead commands a $2 premium.

Zinc Decline Fractional

The small net decline in zinc from 7.60c. to 7.575c. is accounted for principally by the weakness in copper and tin. Sales in fair volume have been made all week, wire makers being important buyers, though the brass founders were by no means out of the market. Dealers were in the market last week and they were responsible in part for the decline. In the Joplin-Miami district ore prices have been advanced to a $53 basis in spite of the fact that output of concentrate is increasing. The total is about 16,500 tons per week, with producers operating at near capacity but being disinclined to do much night-shift work.

Tin Declines Also

In spite of London figures that show a decrease in the world's visible supply of tin, variously estimated at 388 to 580 tons, tin prices have declined under selling pressure. American tin deliveries, according to London, were 6,520 tons in August and 52,195 tons for the first eight months of the year, both of which are new high records. These heavy deliveries seem to have satisfied the requirements of American consumers for the present and account for the lull in demand. No decline in consumption is expected. Nevertheless, the decline from 57.25c. to 56.625c. in the domestic market is largely the result of the weakness in the London market.

Silver Steady and Quiet

Continued China demand has strengthened silver to the extent that new high quotations for the year of 32⅞d. in London and 71⅜c. in New York were reached on Aug. 31. Since that date the London spot price has held, although futures declined ⅛d.; but the New York rate has eased off slightly. At the lower level the market appears steady though quiet.

Mexican Dollars: Aug. 27th, 54⅜c.; 28th, 54½c.; 29th, 54⅜c.; 31st, 55⅛c.; Sept. 1st, 55c.; 2d, 55⅛c.

Italian Exchange Makes Sharp Advance

The feature of the foreign exchange market has been the marked buoyancy in Italian lire, ascribed to purchases by Italian banks and also the Italian government. Francs are firm and fractionally higher. Sterling is a trifle lower. Closing quotations on Tuesday noon Sept. 1 were as follows: francs, 4.70c.; lire, 3.84c.; and marks, 23.8c. Canadian dollars command a premium of 0.0498 per cent.

Steel Firm — Pig-iron Stocks Lower — Coke Active

Pittsburgh, Sept. 1, 1925

Steel production in August was slightly above that for July, and the present rate may possibly be as much as 10 per cent above the July average. There is no definitely increasing trend at the moment, and though it seems likely that July will be left as the low month of the year, no large increase is to be expected in 1925. July, relative to other years, was not really a low month, and the present rate of mill operation is a fairly high one.

There is no occasion for jobbers or consumers to make forward purchases, and hand-to-mouth buying will presumably continue, except in construction steel. Buying in general is fairly heavy, having increased in the last two months, but in some lines it looks as if buyers simply chanced to enter the market at the same time, so that further increases are not necessarily promised.

Buying of line pipe and other oil-country tubular goods has been very heavy for three months, and on account of the season and the unfavorable statistical position of oil, the next change will probably be a decrease in buying. Agricultural-implement work is increasing, and the automobile trade holds up better than expected, necessitating some fresh buying now, for quick shipment. Freight-car buying continues poor and unpromising.

Pig Iron—The turnover continues light, consumers being fairly well covered. Consumption of merchant iron is not heavy, but exceeds production, and furnace stocks, fairly large, are slowly diminishing. Bessemer, $19, basic, $18, foundry, $18.50, f.o.b. Valley furnaces.

Connellsville Coke—The market in spot and prompt furnace coke turned active again last week, on account of eastern buying, and the $3.25 market gave way to a range of $3.35 to $3.65. Spot foundry remains at $3.75 to $4.25, but naturally seems on the verge of an advance.

Lead Ore Unchanged — Zinc Blende Stronger

Joplin, Mo., Aug. 29, 1925

Zinc Blende	Per Ton
High	$58.10
Premium, basis 60 per cent zinc	$55.00@$56.00
Prime Western, 60 per cent zinc	$53.00@$54.00
Fines and slimes, 60 per cent zinc	$52.00@$49.00
Average settling price, all	$53.29
Lead Ore	
High	$133.90
Basis 80 per cent lead	$130.00
Average settling price, all	$127.33

Shipments for the week: Blende, 10,942; lead, 3,172 tons. Value, all ores the week, $988,260.

Shipments for eight months: Blende, 525,624; calamine, 579; lead, 83,562 tons. Value, all ores eight months, $36,635,600.

One purchasing agency advanced the basis to $54, ostensibly for the purchase of blende of low lead content, all other agencies holding offerings on $53 basis Prime Western, at a late hour this afternoon.

Sellers generally have been satisfied to dispose of surplus lead on the $130 basis, though a few are reported withholding their ore from the market.

Platteville, Wis., Aug. 29, 1925

Zinc Blende	Per Ton
Blende, basis 60 per cent zinc	$55.50
Lead Ore	
Lead, basis 80 per cent lead	$132.50

Shipments for the week: Blende, 953 tons; lead, 40 tons. Shipments for the year: Blende, 31,588; lead, 1,396 tons. Shipments for the week to separating plants, 1,754 tons blende.

Other Metals

Quotations cover large wholesale lots, f.o.b. New York, unless otherwise specified.

Aluminum—99 per cent, 28c. per lb.; 98 per cent, 27c. London, 98 per cent, £118 long ton. Market firm, with good demand.

Antimony—Per lb.:

Chinese brands, spot, 16¾@17¼c.; September, 16½@17c.

Cookson's "C" grade, 19§@20c.

Chinese needle, lump, nominal, 14@15c.

Standard powdered needle, 200 mesh, nominal, 17@19c.

White oxide, Chinese, 99 per cent Sb_2O_3, 16@19c.

Bismuth—$2.65@$2.70 per lb. in ton lots. London, 10s.

Cadmium — 60c. per lb. London, 2s. 3d.

Cobalt—Shot, 97@98 per cent, $2.50 per lb. Black oxide, 70 per cent, $2.10; gray oxide, 75 per cent, $2.35. London, 10s. for metal; 8s. for black oxide; 8s. 10d. for gray. Market fair.

[1]Germanium Oxide—25 to 50 gm. lots, $6 per gm.

Iridium—$400 per oz. for 98@99 per cent. Nominal. London, £75.

[1]Lithium—95@96 per cent grade in 1 to 5 lb. lots, $65 per lb.

Magnesium—Ingot, 99.85 per cent, $1 per lb. in 1,000-lb. lots. Market firm. London, 3s. 9d.@4s. 3d. for 99 per cent ingots or sticks.

[1]Molybdenum—99 per cent, $25 per kg.

Monel Metal—Base price for shot, 32c. per lb.

Nickel—Ingot, 33@34c.; shot, 34@35c.; electrolytic, 38c. (99.75 per cent grade). Market fair. London, £170@£175 per long ton.

Osmiridium—Crude, $58.50 per oz.

Osmium—$105@$110 per oz.

Palladium—$78@$83 per oz. Crude, $65 per oz. London, £16 10s., nominal.

Platinum — Refined, $120 per oz. officially quoted. Sales also at $115@$118. Crude, $113@$113.50.

London, £25 per oz. for refined, and £23 for crude.

Quicksilver—Per 75-lb. flask, $82.50@$83. San Francisco wires $81.50. London, £13 10s.

Radium—$70 per mg. radium content.

Rhodium—$90@$95 per oz.

Ruthenium—$85@$90 per oz.

[1]Selenium — Black powdered, amorphous, 99.5 per cent pure, $2.15 per lb. in ton lots.

[1]Tantalum—Metal sheets, $275 per lb.

Tellurium—$2 per lb.

[1]Thallium Metal—Ingot, 99 per cent pure, $6 per lb. in 25-lb. lots.

Tungsten Metal—Powder, 97 to 98 per cent, $1.20 per lb. contained tungsten.

[1]**Zirconium Metal—98** per cent grade, per lb., $30, in 5 to 10 lb. lots.

Metallic Ores

Chrome Ore—Crude, 45 to 50 per cent Cr_2O_3, $20.50@$23.50 per net ton, f.o.b. shipping point. Demand good. Ground, in bags, $29.

New Caledonian, 52-54 per cent Cr_2O_3, $24; nominal.

Situation unchanged.

[1]**Galena Radio Crystals—Best quality (50 per cent of sized fragments good) 50c.** per lb. in 500-lb. lots, f.o.b. Philadelphia.

Iron Ore—Lake Superior ores, per long ton, lower Lake ports:

Mesabi, non-bessemer, 51½ per cent iron, $4.25. Old Range, $4.40.

Mesabi, bessemer, 55 per cent iron, $4.40. Old Range bessemer, 51½ per cent, $4.55.

High-phosphorus foundry, over 0.18 per cent P, $4.15.

Eastern ores, cents per unit delivered at furnaces:

Foundry and basic, 53 to 63 per cent, 9@10c.

Foreign ores, f.o.b. cars Atlantic ports, cents per unit:

Swedish and Norwegian, low-phosphorus, 68 per cent, 11@11½c.

Spanish and Algerian, low-phosphorus, 52@54 per cent, 8@9½c.

Spanish, foundry or basic, 50@54 per cent, 8½@9c.

Swedish foundry or basic, 66@68 per cent, 9@10c.

Manganese Ore—Per long ton unit of Mn, c.i.f. North Atlantic ports:

Brazilian, 42@44c.

Indian, 44c.

Caucasian (unwashed), 42c.

Caucasian (washed), 44c.

Domestic consumers appear to have requirements for current year provided for. Foreign demand also off, but prices fairly well maintained.

Chemical grades[1], powdered, coarse or fine, 82@87 per cent MnO_2, Brazilian and Cuban, $70@$80 per ton in carloads.

Molybdenum Ore—65@70c. per lb. of MoS_2 for 85 per cent MoS_2 concentrates, f.o.b. mines. Market firm.

Pyrite Radio Crystals—50c.@$1 per lb.

Tantalum Ore—Foreign, 75c. per lb. of Ta_2O_5 contained, c.i.f. New York.

Tungsten Ore—Per unit of WO_3, N.Y.:

Ordinary wolframite, $11.50@$11.75.

High-grade wolframite, $12.25@$12.50.

Ordinary scheelite, $11.50@$12.

High-grade scheelite, $12.50@$13.

Prices very firm, though market remains quiet.

Vanadium Ore—Minimum 18 per cent V_2O_5, $1@$1.25 per lb. V_2O_5. Nominal.

Non-Metallic Minerals

Prices received for non-metallic minerals vary widely and depend upon the physical and chemical characteristics of the commodity. Hence the following quotations can only serve as a general guide to the prices obtained by producers and dealers in different parts of the United States for their own product. In the last analysis the value of a particular non-metallic mineral can only be ascertained by direct negotiation between buyer and seller.

The net ton of 2,000 lb. is meant unless otherwise stated.

[1]**Amblygonite—8@9 per cent lithium oxide, $50@$60 per ton, f.o.b. mines.**

Andalusite—Sorted, $35@$50 per ton, f.o.b. South Dakota mines. Quotations nominal.

Asbestos:

Crude No. 1—$400@$450.

Crude No. 2—$250@$300.

Spinning fibers—$125@$200.

Magnesia and compressed sheet fibers—$75@$115.

Shingle stock—$50@$75.

Paper stock—$35@$45.

Paper fillers—$20.

Cement stock—$8@$12.

Floats—$8@$12.

Sand—$6@$8.

All per short ton, f.o.b. mine, Quebec, tax and bags included.

The market is good and prices are firm. Proposed merger, in Canada, is off because largest producer opposed terms. Another merger may eventually be arranged.

No. 1 Rhodesian crude, $310; No. 2, $250 per short ton, c.i.f. New York.

Barytes—F.o.b. Kings Creek, S. C., bags extra:

Crude, $7@$8 per gross ton.

Ground, off color, $14@$17 per short ton.

Charlotte, N. C.:

White bleached, $22 per short ton; white natural, $20.

Crude, unground, but washed, lumps and fines, $7.50@$8.50, f.o.b. Ga.

Crude, $8.50, f.o.b. Mo.

Water ground and floated, bleached, $23@$25, f.o.b. St. Louis.

In Canada, 94@96 per cent $BaSO_4$, $9 per net ton, f.o.b. mine.

Demand steady, but all the barium salts are being imported and this curtails market of American ores.

Bauxite—American, f.o.b. shipping point per gross ton:

Crushed and dried, $5.50@$8.50.

Pulverized and dried, $14.

Calcined, crushed, $19@$20.

Foreign, per metric ton, c.i.f.:

Dalmatian, low SiO_2, $5@$6.50.

Istrian, $5.50@$6.50.

Dutch Guiana bauxite offered at $8.50 per long ton, c.i.f. New York. Market unsettled.

Beryl—$70 per ton, hand-sorted crystals, 14 per cent BeO, in ton lots f.o.b. Vermont. Western beryl, of inferior quality, offered at $45 @ $60 per ton. Market quiet. Several new possible sources of beryl reported in Colorado and Africa.

Borax—Crystals 4¾c. per lb. Granulated or powdered, in bags, carload lots, 4¾c. per lb., delivered.

[1]**Celestite**—90 per cent $SrSO_4$, finely powdered, $30 per ton in carload lots.

Chalk—Precipitated, f.o.b. New York, per lb.:

Heavy, 3¼@4c.

Light, 3¾@4½c.

Extra light, 4¼@5c.

Crude, in bulk, $4.75@$5 per ton.

China Clay (Kaolin)—F.o.b. Virginia mines, per short ton:

Crude, lump, No. 1, $7.

Crude No. 2, $5.50.

Washed, $8.

Powdered, $10@$20.

Powdered (Blue Ridge), $10@$14.

Imported English, f.o.b. American ports:

Lump, $12@$19.

Powdered, $45@$50.

1A grades, domestic, $16@$18, f.o.b. mines. Market slow.

Diatomaceous Earth—Per short ton, f.o.b. plant, *California*:

Kiln-fired brick, $65.

Kiln-fired aggregate, ¼ in., $45.

Insulating powder, $30.

Natural aggregate, ¼ in., $20.

Air-floated powder, $40.

"Calatom" (millrun), $20.

"Calatom," 3b, $30.

Demand fair; becoming more active.

Emery—Per lb., f.o.b. plant:

Greek Naxos, 6½c.

Turkish, 6½c.

Khasia, 5½c.

American, 3½c.

Market fairly good.

Feldspar—Per long ton, f.o.b. cars, *North Carolina:*

No. 1 pottery grade, $5.50@$6, depending upon quality. Market dull.

In *New Hampshire*, per net ton, f.o.b. mines: No. 1, not over 10 per cent SiO_2, $8. Ground, $17, f.o.b. mill.

Market fair.

In *New York*, per ton, f.o.b. cars:

No. 1 crude, $8.

Market good.

In *Maine:*

No. 1, ground, $19.

In *Tennessee:*

Pottery grades, $16@$21, according to analysis and mesh.

Tile grades, No. 2 ground, $14@16.

Market very quiet.

In *Virginia:*

No. 1 Porcelain, 140 mesh, $22.

In *Maryland:*

Enamelers' grade, No. 1, $16.

Glassmakers' grade, No. 1, $15; No. 2, $11.50.

Market fair.

In *Canada*, f.o.b. mine:

High potash, $9, f.o.b. Quebec; market good.

Crude, No. 1, over 12½ per cent potash, less than 5 per cent SiO_2, $7.25 @$7.50 per net ton.

Crude, No. 2, 20 to 25 per cent SiO_2, $5@$5.50 per net ton.

Ground, No. 1, 180 mesh, $20 per net ton, bags included.

Ground, No. 2, 180 mesh, $15 per net ton, bags included.

Fluorspar—F.o.b. Middle Western mines, per net ton:

Gravel, not less than 85 per cent CaF_2, and not over 5 per cent SiO_2, $16@$18. No. 2 lump, 85-5, $19@$20. Some producers holding at $18@$20 rather than sell at a loss. Curtailment of production has strengthened prices, but sales are unsatisfactory.

Ground, 95 to 98 per cent CaF_2 and not over 2½ per cent SiO_2, $32.50 in bulk, $36.50 in bags or barrels.

In Canada, 84@86 per cent CaF_2, less than 5 per cent silica, $18 per net ton, f.o.b. mine.

Fuller's Earth—Per ton, f.o.b. Midway, Fla.:

16 to 30 mesh, $16.50.

30 to 60 mesh, $18.

[1]Price furnished by Foote Mineral Co., Philadelphia.

Ferromanganese—Domestic and foreign, 78@82 per cent, $115 per gross ton. Spiegeleisen, 19@21 per cent, $31@$32 f.o.b. furnace; 16@19 per cent, $31.

Ferrophosphorus—Electrolytic, 18 per cent P, $91 per ton; 24 per cent, $122.50; f.o.b. Ala. and Tenn.

Ferrosilicon—10 to 12 per cent, $33@$38 per gross ton, f.o.b. works; 50 per cent, $85 delivered. Market active.

Ferrotitanium—For 15 to 18 per cent material, $200 per ton, f.o.b. Niagara Falls, N. Y.

Ferrotungsten—$1.10@$1.15 per lb. of contained W, f.o.b. works, according to grade.

Scarcity of the metal is assigned as the reason for the higher price.

[1]Ferro-uranium—30 to 40 per cent U, $4.50 per lb. of U contained, f.o.b. works in 500-lb. lots.

Ferrovanadium—Per lb. of V contained f.o.b. works, $3.25@$4.

Metal Products

Rolled Copper—Sheets, 22⅜c.; wire, 16½c.

Lead Sheets—Rolled, 13¼c., clipped, 13½c.

Nickel Silver—29¼c. per lb. for 18 per cent nickel Grade A sheets.

[1]Price furnished by Foote Mineral Co., Philadelphia.

Yellow (Muntz) Metal—Dimension sheets, 20⅜c. per lb.; rods, 17⅛c. per lb.

Zinc Sheets—11c. per lb., f.o.b. works.

Refractories

Chrome Brick—$45@$48 per net ton, f.o.b. shipping point.

Firebrick—First quality, $43@$46 per M., Ohio, Kentucky, Central Pennsylvania; second quality, $35@$40.

Magnesite Brick—9-in. straights, $65 per net ton, f.o.b. works.

Silica Brick—$40 per M. Pennsylvania and Ohio; $48@$52 Alabama.

[1]Zirkite—Powdered, 80 per cent ZrO_2, 2½c. per lb. Brick, straights, 80c.@$1 each.

Imports and Exports of Ores and Metals in July, 1924 and 1925

Compiled by the U. S. Department of Commerce.

Imports

In pounds unless otherwise specified

Antimony	July, 1924	July, 1925
Ore	83,040	919,397
Liquated, regulus, or metal	1,075,424	2,078,493
Copper		
Ores	6,031,317	6,889,027
Concentrates	3,962,839	3,618,005
Regulus	43,000	14,955
Total	10,037,156	10,521,987
Imported from		
Spain	556,576	1,168,317
Canada	282,689	4,191,219
Mexico	2,084,239	1,798,130
Cuba	2,537,920	1,825,600
Chile	3,514,581	1,320,680
Colombia	.....	.....
Peru	162,568	105,657
Other countries	898,583	112,384
Unrefined, black, blister, and converted copper in pigs, and other forms	36,204,412	33,592,846
From:		
Spain	3,944,999	809,086
United Kingdom	169,499	.....
Canada	2,195,636	4,226,614
Mexico	3,557,452	5,739,709
Chile	12,405,405	9,026,670
Peru	5,427,330	5,941,583
Portuguese Africa	8,512,932	7,849,184
Other countries	159	.....
Refined copper	17,002,788	4,463,684
Old and clippings for remanufacture	88,863	458,729
Composition metal, copper chief value	900	22,252
Copper manufacturers	9,853	6,624
Brass		
Old and clippings for remanufacture	389,608	722,729
Manufactures of brass	87,639	77,813
Lead		
Ore and matte	6,326,198	6,085,041
Bullion or base bullion	14,465,120	4,895,488
Pigs, bars, other forms and old	2,084,236	1,918,101
Manufacturers of, except type metal	29,788	14,849
Manganese ore, long tons	22,173	27,606
Tin:		
Tin ore, tons	11	1
In blocks, bars, and pigs	10,825,509	15,085,616
From:		
United Kingdom	1,320,583	4,895,100
British Straits Settlement	8,829,630	7,097,479
China	.....	280,347
Dutch East Indies	329,097	.....
Hongkong	178,230	807,763
Australia	22,400	11,200
Other countries	145,569	1,993,727
Zinc:		
Ore, Free	.....	.....
Dutiable	.....	221,840
Blocks, pigs and other forms	155	19,359
Zinc dust	29,046	5,407

Exports of Copper, Lead, and Zinc

Copper	July, 1924	July, 1925
Ores, concentrates, matte and regulus	.....	203,865
Copper and manufacturers of	80,036,667	106,259,879
Refined in ingots, bars, and other forms	71,252,809	97,132,022
Exported to:		
Belgium	6,278,997	11,005,636
France	15,081,638	13,232,676
Germany	9,112,936	25,918,806
Italy	8,182,077	17,232,602
Netherlands	2,650,924	5,906 353
Spain	459,822	459,913
Sweden	2,889,558	2,744,372
United Kingdom	18,190,528	15,128,184
Canada	1,804,914	2,445,539
China	4,297,097	.....
Japan	671,848	448,024
Other countries	1,632,470	2,609,917
Old and scrap copper	141,345	1,057,660
Pipes and tubes	393,755	175,988
Plates and sheets	346,564	695,484
Rods	5,259,879	5,098,241
Wire	645,483	547,671
Insulated copper wire and cable	1,104,281	1,222,198
Other manufacturers of copper	892,551	330,615
Lead		
Pigs, bars, and other forms		
From domestic ore	2,621,816	337,765
From foreign ore	19,053,311	17,983,903
Exported to:		
France	3,136,574	1,680,412
Germany	1,131,718	4,179,398
Italy	952,330	56,020
Netherlands	669,520	672,145
United Kingdom	14,186,100	9,308,278
Other Europe	560,186	672,368
Argentina	392,000	192,518
Brazil	537,684	.....
Japan	.....	560,022
Other countries	108,815	1,000,507
Other lead manufactures	1,384,884	1,568,979
Zinc		
Dross	.....	2,224,837
Ores and concentrates	688	7,193
Zinc (spelter) in slbas, blocks or pigs	9,882,325	18,342,606
Exported to:		
Belgium	504,059	811,983
France	2,230,325	2,700,130
Germany	201,576	714,169
Italy	491,437	2,252,355
United Kingdom	6 230,423	10,663,833
Other Europe	220	459,621
Canada	4,789	5,051
Japan	56,024	.....
Other countries	163,472	735,466
In sheets, strips, and other forms	298,278	917,588
Zinc dust	496,099	382,284
Other zinc manufacturs	53,676	50,763

Company Reports

Granby Consolidated M. S. & P. Co.

Copper; British Columbia

The Granby Consolidated Mining, Smelting & Power Co. produced 19,107,576 lb. of copper during the first half of 1925, and made a net operating profit of $464,821.53, without allowing for depreciation and depletion, which for the whole of last year amounted to $1,604,765.05. The average cost of the production of marketable copper during the first quarter of the year, when, owing to a shortage of water, auxiliary steam power had to be used, was 11.53c. per lb.; during the second quarter, operating entirely by water-power, the cost was reduced to 9.25c., which compares favorably with 10.6c., the average cost of production during 1924. The mill, which has been operating regularly, produced 4,694,875 lb. from 198,283 tons of ore.

St. Joseph Lead Co.

The report of the St. Joseph Lead Co. and subsidiary companies for the six months ended June 30, 1925:

Net income	$7,142,196.11	
Less provision for depreciation	414,440.25	
Balance		$6,727,755.86
Fixed charges		28,016.67
Balance		$6,699,739.19
Provision for depletion		1,278,942.16
Surplus for the period after deducting depletion		$5,420,797.03

No provision has been made for federal income taxes for the six months ended June 30, 1925.

60 to 100 mesh, $15.
100 mesh "up" $8.
200 mesh "up" $15.
Powdered, imported, duty paid, $23 @$25 per ton.
Market fair.

Garnet—Per short ton:
Spanish grades, $60, c.i.f. port of entry.
Domestic Adirondack, $85, f.o.b. shipping point.
Canadian, $70@$80, f.o.b. mines.

Gilsonite—Per ton, f.o.b. Colorado:
Jet asphaltum, $36.
Selects, $33.
Seconds (ordinary grades), $25.50.
Peerless black, $32.90.
Market steady.

Graphite—First quality, per lb.:
Ceylon lump, 8½@9c.
Ceylon chip, 6½@7c.
Ceylon dust, 3½@5c.
Market fair.
Flake, 10@30c.
Manufactured grades:
Fine ground, crystalline, 8c. up.
Facings, 4@8c.
Foreign supplies limited and domestic prices expected not to go lower.

Greensand—Per net ton, f.o.b. cars, New Jersey:
Run of mine, $15.
Washed and dried, $20.
Market improving.

Gypsum—Per ton, depending upon source:
Crushed rock, $2.75@$3.
Ground, $4@$6.
Agricultural, $6@$7.
Calcined, $8@$11.

Ilmenite—Concentrates, 52 per cent TiO_2, 1½c. per lb., f.o.b. Virginia points. $60 per short ton, Florida mines.

Iron Oxide (See Ocher)—Standard Spanish red, 2½@3¾c. per lb.
Domestic earth, 1¾@4½c. per lb.

Kaolin—See China Clay.

Lepidolite—$20@$30 per ton for ordinary grades. Nominal.

Limestone—Depending upon source, f.o.b. shipping points; per ton:
Crushed, ½ in. and less, 90c.@$2.
Crushed, 3 in. and larger, 90c.@$1.50.
Agricultural, 60c.@$5 for pulverized, depending upon source, purity, and fineness.

Magnesite—Per short ton, f.o.b. *California* mines: Prime white, $40.
Grade "A," $40.
Grade "B," $38.
Market very good.
Dead-burned, $40, f.o.b. Eastern seaboard.
Market slightly below normal.

Manjak—Barbados, in 10-ton lots, c.i.f. New York:
Grade "A." 6c. per lb.
Grade "AA," fine, 8c. per lb.

Mica—
North Carolina prices:
Scrap, $30 per net ton.
Sheet, per lb., No. 1 and No. 2: Punch, 1¼ in., 5@8c.

2 x 2 in., 25c.	3 x 4 in., $1.60
2 x 3 in., 60c.	3 x 5 in., $2.00
3 x 3 in., $1.00	4 x 6 in., $2.40

Dry ground, roofing, 20 mesh, $35 per ton.
Dry ground, 100 mesh, $70.
Market good.

In *New Hampshire:*
Mine run, $350 per ton.
Clean shop scrap, $25; mine scrap, $20.
White, dry ground, f.o.b. New England mill:
20 mesh, $30 per ton.
40 mesh, $45.
60 mesh, $60.
100 mesh, $75.
200 mesh, $85.
Market fair. Considerable bidding for scrap mica has sent price up in recent months. Some grinders said to be paying $25@$30 per ton for scrap mica delivered to mill.
Madagascar, amber, dark, free from iron, per lb., f.o.b. New York, duty paid:
Special grade, $3.15.

No. A1.....$2.70	No. 3.....$1.15
No. 1.....2.25	No. 4..... .65
No. 2.....1.90	No. 5..... .45

Moderate demand.

[1]**Monazite**—Minimum 6 per cent ThO_2. $120 per ton.

Ocher—F.o.b. Georgia mines, per net ton: $22.50@$25 in sacks; $25@$30 in barrels.
Washed and water floated, $25@$28.
Market fair to good.

Phosphate — Per long ton, f.o.b., *Florida* export prices:
76@77 per cent, pebble, $5.90.
75 per cent, $5.40.
74@75 per cent, $5.15.
70 per cent, $3.50.
68 per cent, $3.10.
Market firm.
Per long ton, f.o.b. Tennessee mines:
72 per cent B. P. L., $4.50@$5.
75 per cent, $6@$6.50.

Potash—	Bags	Bulk
Muriate of potash 80@85 per cent, basis 80 per cent	$34.55	$33.30
Sulphate of potash 90@95 per cent, basis 90 per cent	45.85	44.60
Sulphate of potash-magnesia 48@53 per cent, basis 48 per cent	26.35	25.10
Manure salt 30 per cent	19.03	17.80
Manure salt 20 per cent	12.55	11.00
Kainit 14 per cent	10.25	8.25
Kainit 12.4 per cent	9.75	7.75

Two thousand pounds net weight, c.i.f. Atlantic and Gulf ports. German weights, tares and analyses.
Discounts for prompt shipment:
5 per cent on minimum quantity of 50 short tons K_2O
6 per cent on minimum quantity of 100 short tons K_2O
7 per cent on minimum quantity of 300 short tons K_2O
10 per cent on minimum quantity of 500 short tons K_2O

Pumice Stone — Powdered, in bbl., 3@5c. per lb.
Lumps, in bbl., 6@8c.; 4@6c. in bags.

Pyrites—Tharsis, per long ton unit of sulphur, c.i.f. U. S. ports:
Furnace size, 13c.
Cinder from ore to remain property of buyers. Market rather dull with some improvement in conditions anticipated.

[1]**Quartz Rock Crystals** — Colorless, clear and flawed, pieces ¼ to ½ lb. in weight, 40c. per lb. in ton lots.
For optical purposes, double above prices.

Rutile—F.o.b. Virginia points, per lb.:
Granular, 94@96 per cent TiO_2, 12@15c.

[1]Price furnished by Foote Mineral Co., Philadelphia.

Pulverized, 100 mesh, 94@96 per cent, 17@30c.
93 per cent TiO_2, $200 per ton, Florida.

Silica—Water ground and floated, per ton, f.o.b. Illinois:
400 mesh, $31.
325 mesh, $25.
250 mesh, $19.
Glass sand, $1@$5 per ton; brick and molding sand, 30c.@$2. Fair.

Spodumene — $20@$30 per ton, depending upon lithium content. Nominal.

Sulphur—$15@$16 per ton for domestic, f.o.b. Texas mines; $19 for export, f.a.s. New York.

Talc—Per ton, in 50-lb. paper bags, *Vermont* mills, carloads:
Ground, 200 mesh, extra white, $11@$12.
180 mesh, medium white, $10.50@$11.50.
160 mesh, medium white, $10@$11.
If packed in burlap bags, $1 per ton less, plus 15c. each for bags.
Prices firm but demand rather quiet.
In *New York*, double air-floated, including containers, per net ton:
200 mesh, $13.75.
325 mesh, $14.75.
Demand fair.
In *Georgia*, powdered, per ton:
Gray, $8@$10.
Yellow, $9@$11.
Red, $12@$12.50.
White, $10@$15.
Air-floated, $15@$25.
Roofing, $7.50@$9.
Market fair to good.
In *New Jersey*, per ton:
Soapstone, ground, $9@$11.
Serpentine for granite and stucco, $16@$20.
Market fairly good.

Tripoli—Per short ton, burlap bags, paper liners, per minimum carload 30 tons, f.o.b. Missouri:
Once ground through 40 mesh:
Rose and cream colored, $20.
White, $18@$27.
Double ground through 110 mesh:
Rose and cream, $17@$25.
White, $19@$30.
Air-float through 200 mesh:
Rose and cream, $35@$40.
White, $40.
Seasonal stimulation in demand has already started.

Zircon—Freight allowed east of Mississippi River:
99 per cent, 3c. per lb., f.o.b. Florida, in carload lots.

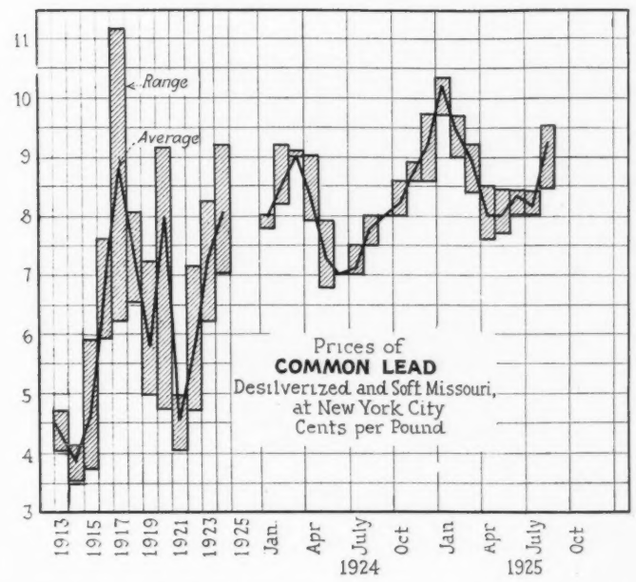
Mineral Products

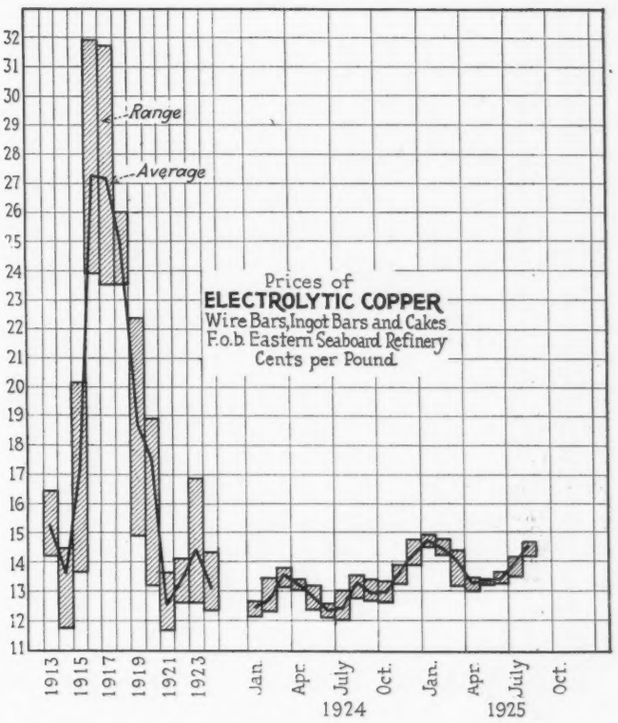
Arsenious Oxide (white arsenic)—3.75c. per lb. delivered. Quiet.
Copper Sulphate—4.50@4.75c. per lb.
Sodium Nitrate—Spot, $2.47@$2.50 per 100 lb., ex vessel Atlantic ports.
Sodium Sulphate—$0.80@$1.30 per 100 lb., f.o.b. works.
Zinc Oxide—Per lb. in bags:
Lead free, 7½c.
Leaded grades, 7c.
French, 9¾@12c.

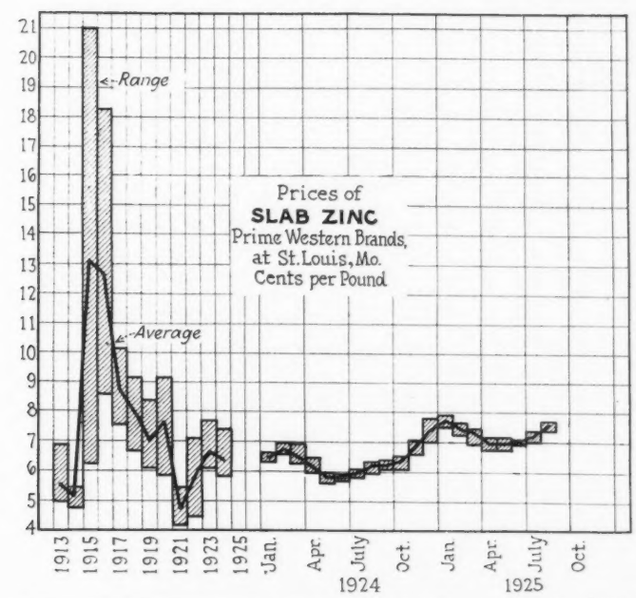
Ferro-Alloys

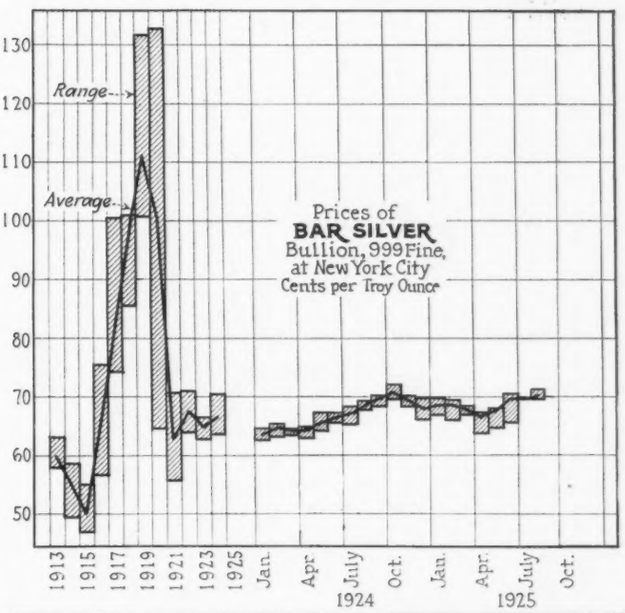
[1]**Ferrocerium**—$7 per lb.
Ferrochrome — 0.1 per cent carbon, 35c. per lb. of contained chromium; 2 per cent carbon, 23c. per lb.; 4 to 8 per cent carbon, 11@11½c. per lb.

Metal Price Curves

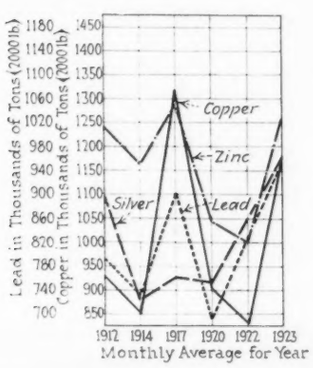


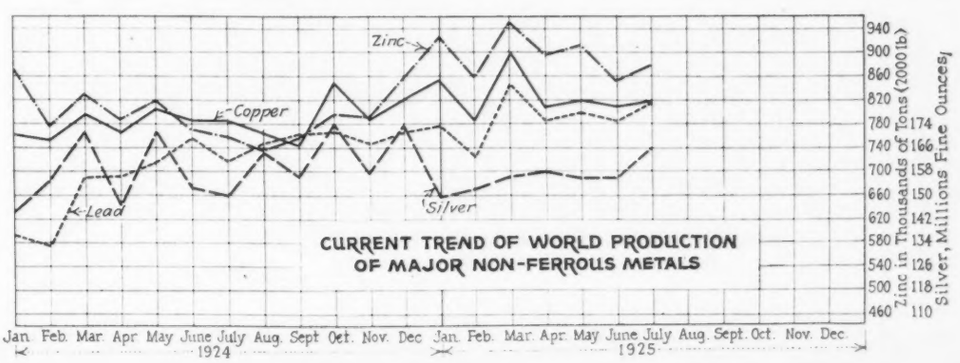






THE curves below are not to be considered as permanent records of production. They show merely the current trend according to latest estimates of the American Bureau of Metal Statistics. The figure for copper represents reports from countries producing about 97 per cent of the world's total in 1923 and 1924, to which is added an estimate for the remaining 3 per cent. Countries that in 1923 and 1924 produced 78.5 per cent of the lead, 87.5 per cent of the zinc, and 81 per cent of the silver are represented in the respective curves, with no estimate for non-reporting countries.




Zinc
Copper
Lead
Silver
CURRENT TREND OF WORLD PRODUCTION
OF MAJOR NON-FERROUS METALS
Zinc in Thousands of Tons (2000 lb)
Silver, Millions Fine Ounces
Jan. Feb. Mar. Apr. May June July Aug. Sept. Oct. Nov. Dec. Jan. Feb. Mar. Apr. May June July Aug. Sept. Oct. Nov. Dec.
1924 1925

Metal Statistics

Monthly Average Prices of Metals

Silver

	New York		London		Sterling Exchange	
	1924	1925	1924	1925	1924	1925
January	63.447	68.447	33.549	32.197	425.524	477.702
February	64.359	68.472	33.565	32.245	430.457	476.886
March	63.957	67.808	33.483	31.935	428.769	477.279
April	64.139	66.899	33.065	31.372	434.788	479.034
May	65 524	67.580	33.870	31.276	435 716	484.960
June	66.690	69.106	34.758	31.863	431.675	485.553
July	67.159	69.442	34.509	31.954	436.649	485.514
August	68.519	70.240	34.213	32.268	449.510	485.264
September	69.350	.....	34.832	.....	445.740	.....
October	70.827	.....	35.387	.....	448.274	.....
November	69.299	.....	33.775	.....	460.543	.....
December	68.096	.....	32.620	.....	469.115	.....
Year	66.781	.....	33.969	.....	441.397	.....

New York quotations, cents per ounce troy, 999 fine, foreign silver. London, pence per ounce, sterling silver, 925 fine.

Copper

	New York Electrolytic		London Standard		London Electrolytic	
	1924	1925	1924	1925	1924	1925
January	12.401	14.709	61.273	66.065	67.193	70.607
February	12.708	14.463	63.113	64.713	68.167	69.525
March	13.515	14.004	66.137	62.892	72.087	67.739
April	13.206	13.252	64.338	60.575	70.150	64.194
May	12.772	13.347	62.006	60.131	67.648	63.560
June	12.327	13.399	61.375	59.899	66.313	63.369
July	12.390	13.946	61.652	61.467	65.815	65.750
August	13.221	14.490	63.481	62.613	67.800	68.169
September	12.917	.....	62.750	.....	67.125	.....
October	12.933	.....	62.641	.....	66.620	.....
November	13.635	.....	63.731	.....	68.063	.....
December	14.260	.....	65.295	.....	69.762	.....
Year	13.024	.....	63.149	.....	68.062	.....

New York quotations, cents per lb. London, pounds sterling per long ton.

Lead

	New York		St. Louis		London	
	1924	1925	1924	1925	1924	1925
January	7.972	10.169	8.002	9.953	31.528	41.443
February	8.554	9.428	8.643	9.126	34.589	37.944
March	9.013	8.914	8.891	8.578	37.161	36.804
April	8.263	8.005	7.932	7.662	32.819	32.791
May	7.269	7.985	6.973	7.780	29.426	32.283
June	7.020	8.321	6.848	8.024	32.138	33.479
July	7.117	8.151	6.886	8.054	32.916	34.698
August	7.827	9.192	7.764	9.284	32 728	38.188
September	8.00	.....	7.876	.....	33.023	.....
October	8.235	.....	8.118	.....	35.715	.....
November	8.689	.....	8.590	.....	39.425	.....
December	9.207	.....	9.106	.....	41.583	.....
	8.097	.....	7.969	.....	34.421	.....

New York and St. Louis quotations, cents per lb. London, pounds sterling per long ton.

Tin

	New York 99%		New York Straits		London	
	1924	1925	1924	1925	1924	1925
January	48.250	57.692	48.750	58.250	246.790	265.560
February	52.772	56.517	53.272	57.068	272.399	262.181
March	54.370	53.038	54.870	53.733	277.429	245.682
April	49.457	51.380	49.957	52.135	250.863	237.006
May	43.611	53 675	44.111	54 620	218.511	245.476
June	42.265	54.885	42.765	55.957	219.219	252.476
July	45.750	56.683	46.250	58.014	233.332	258.435
August	51.409	56.649	51.909	58.190	254.638	258.538
September	48.595	.....	49.095	.....	243.511	.....
October	50.038	.....	50.538	.....	248.543	.....
November	53.848	.....	54.348	.....	257.738	.....
December	55.721	.....	56.245	.....	261.875	.....
Year	49.674	.....	50.176	.....	248.737	.....

New York quotations, cents per lb. London, pounds sterling per long ton.

Zinc

	St. Louis		London		
	1924	1925	1924	1925 Spot	1925 3 M
January	6.426	7.738	34.761	37.917	.....
February	6.756	7.480	36.518	36.528	.....
March	6.488	7.319	35.298	35.741	.....
April	6.121	6.985	32.588	34.644	.....
May	5.793	6.951	30.648	34.223	.....
June	5.792	6.990	31.788	34.149	.....
July	5.898	7.206	32.193	34.894	34.511
August	6.175	7.576	32.544	36.691	36.219
September	6.181	.....	32.926	.....	.....
October	6.324	.....	33.514	.....	.....
November	6.796	.....	35 022	.....	.....
December	7.374	.....	36.932	.....	.....
Year	6.344	.....	33.728	.....	.....

St. Louis quotations, cents per pound. London, pounds sterling per long ton.

Antimony, Quicksilver and Platinum

	Antimony (a) New York		Quicksilver (b) New York		Platinum (c) Refined New York		Platinum (c) Crude New York	
	1924	1925	1924	1925	1924	1925	1924	1925
January	10.279	17.428	59.500	81.596	122.115	117.000	111.663	
February	10.935	19.795	59.565	79 386	124.739	117.000	114.216	
March	11.442	15.553	64.269	80 481	121.692	117.000	115.000	
April	9.952	12.553	74.308	82.327	115.577	118 269	114.769	
May	8.755	15.770	76.962	81.360	115.731	119.850	115.000	
June	8.403	16.500	73.720	83.154	116.000	120.000	115.000	
July	8.477	17.779	72.173	83.077	118.231	120.000	114.346	
August	9.839	17.683	72.096	82.317	120.000	120.000	113.538	
September	11.022	.....	72.423	.....	118.923	.....	.....	
October	11.519	.....	70.654	.....	118.000	.....	.....	
November	14.385	.....	68.708	.....	117.792	.....	.....	
December	15.024	.....	72.750	.....	117.000	.....	.....	
Year	10.836	.....	69.761	.....	118.817	.....	.....	

(a) Antimony quotations in cents per lb. for ordinary brands. (b) Quicksilver in dollars per flask. (c) Platinum in dollars per ounce.

Pig Iron, Pittsburgh

	Bessemer		Basic		No. 2 Foundry	
	1924	1925	1924	1925	1924	1925
January	24.76	24.66	23.76	23.76	23.88	23.76
February	25.26	24.50	23.76	23.26	25.06	23.76
March	25.14	24.06	23.76	23.06	24.76	22.91
April	24.56	22.89	23.26	21.76	23.80	22.26
May	23.89	21.57	22.08	20.26	22.91	21.16
June	22.90	20.76	21.49	19.76	21.48	20.11
July	21.90	20.76	20.76	19.76	20.76	20.26
August	21.76	20.76	20.76	19.76	20.99	19.26
September	21.76	.....	20.76	.....	21.68	.....
October	21.76	.....	20.26	.....	21.26	.....
November	22 08	.....	21.44	.....	21.17	.....
December	23.65	.....	22.04	.....	22.86	.....
Year	23.28	.....	22.01	.....	22.55	.....

In dollars per long ton.

Monthly Crude Copper Production in Pounds

Domestic

	1925 April	May	June	July
Alaska shipments	7,329,681	5,756,693	5,694,810	7,280,663
Calumet & Arizona	5,196,000	4,410,000	3,848,000	3,752,000
Miami	4,388,000	4,419,000	4,391,000	3,722,300
New Cornelia	6,335,821	6,691,648	6,230,956	5,667,435
Old Dominion	2,550,000	2,836,000	2,762,000	2,240,000
Phelps Dodge	13,797,000	14,108,000	14,428,000	13,755,000
United Verde Extension	3,819,358	3,625,252	3,130,812	3,861,794
Tennesse Copper	.....	.....	.....	1,098,000
Imports: Ore and concentrates, matte	18,022,747	25,276,355	13,796,247	10,521,987
Imports of black and blister, unrefined	40,255,461	31,412,309	52,698,756	33,592,846
Imports of refined and old	8,508,750	8,771,697	14,595,751	4,922,413

Foreign

Boleo, Mexico	110,250	.....	1,694,000	1,582,472
Falcon Mines, Rhodesia	.....	.....	.....	422,754
Furukawa, Japan	3,367,833	2,630,688	.....	.....
Cons. M. & S., Canada	.....	.....	.....	.....
Granby Cons., Canada	3,316,290	3,529,582	.....	.....
Katanga, Africa	15,435,000	17,996,160	18,830,876	18,090,432
Mount Morgan, Aust	722,000	998,000	.....	.....
Mount Lyell, Aust	.....	.....	.....	.....
Phelps Dodge, Mexican	3,283,000	3,147,000	3,528,000	3,964,000
Sumitomo, Japan	2,445,236	1,139,675	2,823,630	3,140,909

Monthly Production of Primary Copper from U. S. Mines and Daily Rate (Short Tons)

	1923 Monthly Production	1923 Daily Rate	1924 Monthly Production	1924 Daily Rate	1925 Monthly Production	1925 Daily Rate
January	56,134	1,811	66,631	2,149	74,789	2,412
February	51,368	1,834	65,681	2,205	68,967	2,463
March	60,781	1,961	65,181	2,103	74,901	2,416
April	59,078	1,969	66,073	2,202	70,667	2,356
May	62,718	2,023	65,608	2,116	70,574	2,276
June	62,740	2,091	63,933	2,131	69,894	2,330
July	63,071	2,034	64,787	2,090	67,648	2,182
August	65,865	2,125	66,756	2,153	.....	.....
September	62,255	2,075	63,800	2,127	.....	.....
October	66,035	2,130	68,989	2,225	.....	.....
November	63,885	2,129	68,291	2,276	.....	.....
December	64,832	2,091	67,647	2,182	.....	.....
Total	738,763	.....	793,377	.....	497,440	.....
Monthly average	61,564	.....	66,115	.....	71,063	.....
Average of daily rates	.....	2,024	.....	2,168	.....	2,346

Mining Stocks—Week Ended August 29, 1925

Stock	Exch.	High	Low	Last		Last Div.
COPPER						
Anaconda	New York	43⅜	41¼	42	Jy.18, Au.24, Q	0.75
Arcadian Consol.	Boston	1⅛	1⅛	1¼		
Ariz. Com'l.	Boston	13	12	12	Jy.21, Jy.31 SA	0.50
Calaveras	N. Y. Curb	1½	1½	1½		
Calumet & Arizona	New York	52	50	50	Se.4, Se.21 Q	1.00
Calumet & Hecla	Boston	15⅞	15½	15½	Au.31, Se.15 Q	0.50
Canario Copper	N. Y. Curb	8	7⅞	7⅞		
Cerro de Pasco	New York	54⅜	52	52½	Au.21, Se.1, Q	1.75
Chile Copper	New York	35⅜	34	34⅝	Sep.2,Sep.28,Q	0.62½
Chino	New York	23½	22½	22½	Sept., 1920	0.37½
Con. Coppermines	N. Y. Curb	3	2⅞	2⅞		
Copper Range	Boston	22½	20½	21½	Ap.9, My.4	1.00
Crystal Copper	Boston Curb	*41	*36	*37		
East Butte	Boston	4¼	4	4	Dec., 1919	0.50
First National	Boston Curb	*18	*15	*17	Feb., 1919	0.15
Franklin	Boston	1¼	*80	*80		
Granby Consol.	New York	19½	17	17	May, 1919	1.25
Greene-Cananea	New York	14⅜	14	14	Nov., 1920	0.50
Hancock	Boston	*50	*50	*50		
HoweSound new r t c	New York	23⅞	23	23⅛	April, 1924	0.05
Inspiration Consl	New York	28¾	26¼	27½	Se.17, Oc.5, Q	0.50
Iron Cap	Boston Curb			1⅞	May, 1923	0.15
Isle Royale	Boston	14⅜	13⅞	13⅜	Sept., 1923	0.50
Jerome Verde Dev	N. Y. Curb	*90	*76	*90		
Kennecott	New York	56½	54½	54⅜	Jn.5, Jy.1, Q	0.75
Lake Copper	Boston	1⅜	1⅛	1⅜	Jn.1, Jn.15 Q	0.50
Magma Copper	NewYork	43⅜	41⅜	41½	Jn. 15, Jy. 15,	0.75
Mason Valley	N. Y. Curb	2	2	2		
Mass Consolidated	Boston	*99	*55	*70	Nov., 1917	1.00
Miami Copper	New York	10⅜	9⅞	9⅞	Au.1 Au.15 Q	0.25
Mohawk	Boston	33⅜	31⅛	31½	Aug. 1, Sept. 2	1.00
Mother Lode Coal	New York	8	7½	7½	Jn. 12, Jn. 30	0.37½
Nevada Consol.	New York	13⅜	13⅛	13⅜	Sept., 1920	0.25
New Cornelia	Boston	20⅜	20	20	Aug. 7 Aug. 24	0.25
North Butte	Boston	1⅜	1½	1½	Oct., 1918	0.25
Ohio Copper	N. Y. Curb	*80	*76	*77	No.14, De.2	0.05
Old Dominion	Boston	22	20	20	Dec., 1918	1.00
Phelps Dodge	Open Mar.	†112	†109		Jn 20, Jy.2 Q	1.00
Quincy	Boston	26¾	24½	24½	Mar., 1920	1.00
Ray Consolidated	New York	14⅜	14	14	Dec., 1920	0.25
Ray Hercules	N. Y. Curb			14		
St. Mary's Min. Ld.	Boston	39⅜	34⅞	34⅞	Ap. 20, My.20,	3.00
Shannon	Boston	*60	*60	*60	Nov., 1917	0.25
Shattuck Arizona	New York	6½	6	6	Jan., 1920	0.25
Superior & Boston	Boston	1⅜	1⅜	1⅜		
Tenn. C. & C.	New York	10⅞	10⅜	10⅜	De.31, Ja.15,Q	0.25
United Verde Ex	N. Y. Curb	24⅜	23⅜	24¾	Jy. 6, Aug. 1	0.50
Utah Copper	New York	100	99½	100	Mh.20,Mh 31,Q	1.00
Utah Metal & T	Boston	*55	*50	*50	Dec., 1917	0.30
Victoria	Boston	*35	*30	*35		
Walker Mining	Salt Lake	2.30	2.05	2.27½		
NICKEL-COPPER						
Internat. Nickel	New York	35⅜	33⅜	34	March, 1919	0.50
Internat. Nickel pfd.	New York	*99⅛	99⅛	99⅛	Jy.16, Au.1, Q	1.50
LEAD						
Carnegie Lead & Zinc	Pittsburgh	6⅜	6¼	6⅜		
Gladstone M. M. Co.	Spokane	*24½	*24	*24	Jy. 1, Jy. 10	0.01
National Lead	New York	162½	155	157½	Sep.11, Sep.30	2.00
National Lead pfd.	New York			118½	Aug.21, Sep.15	1.75
St. Joseph Lead	New York	43¼	41¼	41⅝	Jn.9, Jn.22,	0.50
ZINC						
Am. Z. L. & S.	New York	8⅜	8	8⅜	May, 1920	1.00
Am. Z. L. & S. pfd.	New York	31⅜	31¾	31¾	Nov., 1920	1.50
Butte C. & Z.	New York	6⅜	6	6	De.10, De.24	0.50
Butte & Superior	New York	10⅜	10⅛	10⅛	Mh.19, Mh.31	0.50
Callahan Zn-Ld.	New York	3	2⅞	2⅞	Dec., 1920	0.50
New Jersey Zn.	N. Y. Curb			205¼	Jn.20,Jy.10 Ex.	2.00
United Zinc	N. Y. Curb			*35		
Yellow Pine	Los Angeles	*74	*68	*74	De.10,De.15 Q	0.04
GOLD						
Alaska Juneau	New York	1⅜	1⅛	1⅛		
Argonaut	Toronto	*32	*30	*32		
Barry-Hollinger	Toronto	*38	*37	*37		
Carson Hill	Boston	*80	*60	*60		
Consol. W. Dome L.	Toronto	*14¾	*13½	*13⅞		
Cresson Consol. G.	N. Y. Curb	3	3	3	Mh.31, Ap.10 Q	0.10
Crown Reserve	Toronto	*21	*15¾	*21	Jan. 1917	0.05
Dome Mines	New York	16	14	15⅝	Mh.31,Ap.20,Q	0.50
Golden Cycle	Colo. Springs			1.51	Dec.11, 1924	0.03
Hollinger Consol.	Toronto	15.19	14.90	14.90	Au.24, Se.9	0.08
Homestake Mining	New York	45	45	45	Au.20 Au.25 M	0.50
Kirkland Lake	Toronto	*46	*45	*44½		
Lake Shore	Toronto	6.45	6.25	6.25	Se.1, Se.15,	0.05
McIntyre-Porcupine	New York	19⅛	18⅞	18⅞	Aug.1, Sept.1	0.25
Newray	Toronto	*24	*23	*23		
Night Hawk Pen.	Toronto			*20		
Portland	Colo. Springs			*42	Oct., 1920	0.01
Rand Mines	New York	36⅞	36⅞	36⅞	Au.17, Au.25	1.52
Teck-Hughes	Toronto	1.72	1.68	1.71		
Tom Reed	Los Angeles	*57	*50	*57	Dec., 1919	0.02
Tough-Oakes	Toronto	*42	*35½	*39½		
United Eastern	N. Y. Curb			*47	July, 1924	0.05
Vipond Cons.	Toronto	1.20	1.18	1.20		
Wright-Hargreaves	Toronto	5.15	5.10	5.10	Jn.15, Jy.1	5.00
GOLD AND SILVER						
Black Oak	N. Y. Curb			*81		
Con. Cortez	N. Y. Curb	*8	*7	*7		
Con. Virginia	San Francisco	5½	4½	5⅛		
Continental Mines	N. Y. Curb			1⅞		
Dolores Esperanza	N. Y. Curb			*50	July, 1923	0.05
Premier Gold	N. Y. Curb	2½	2 3/16	2⅛	Jn.18, Jy.1,	0.08
Tonopah Belmont	N. Y. Curb	*75	*70	*70	Sep. 15, Oct. 1,	0.05
Tonopah Divide	N. Y. Curb			*23	Oct., 1923	0.10
Tonopah Extension	N. Y. Curb	1⅜	1 5/16	1⅜	Mh.11, Ap.1, Q	0.05
Tonopah Mining	N. Y. Curb	5⅜	4½	5⅜	Mh.31, Ap.21,	0.07½
Unity Gold	N. Y. Curb	*80	*80	*80		
West End Consol.	N. Y. Curb			*50	Mar., 1923	0.05
Yukon Gold	N. Y. Curb			*26	June, 1918	0.02

Stock	Exch.	High	Low	Last		Last Div
SILVER						
Alvarado	Boston Curb	†1	*25		Oct. 1920	0.50
Beaver Consol.	Toronto	*34½	*32½	*33	May, 1920	0.03
Castle-Trethewey	Toronto	1.05	1.02	1.02		
Coniagas	Toronto	1.65	1.65	1.65	May, 1924	0.12½
Keeley	Toronto	1.81	1.74	1.79	Au.31,Se.15RX	0.12
Kerr Lake	N. Y. Curb	1⅛	1	1	Ap.1, Ap.15, Q	0.12½
La Rose	Toronto	*45	*41	*42½	Apr., 1922	0.10½
Lorrain Trout Lake	Toronto	*90	*90	*90	Jy. 2, Jy.15	0.05
McKiniey-Dar.-Sav.	Toronto	*23	*21	*21½	Oct., 1920	0.03
Mining Corp. Can.	Toronto	2.68	2.56	2.65	Jy.1, Jy.15	0.12½
Nipissing	N. Y. Curb	4⅞	4⅝	4⅝	Jn.30, Jy 20, Q	0.15
Ontario Silver	New York	7¼	7	7¼	Jan., 1919	0.50
Temiskaming	Toronto			*16	Jan., 1920	0.40
SILVER-LEAD						
Ahumada	New York	11¼	10⅞	10⅞	Jn.15,Jy.2,QEx	0.25
Bingham Mines	Boston	35	34	34	Jn.20, Jn.30 Q	0.50
Cardiff M. & M.	Salt Lake	1.60	1.50	1.50	De.16, No.18	0.10
Chief Consol.	Salt Lake	2.50	2.40	2.50	Ap 10, My. 1	0.10
Columbus Rexall	Salt Lake	*7⅞	*7⅛	*7½	Aug., 1923	0.05
Erupcion	Boston Curb	2⅞	2⅝	2⅞	Jn.15,Jy.2,QEx	0.25
Federal M. & S.	New York	17½	17½	17½	Fe.26, Mh.15 Q	1.75
Federal M. & S. pfd.	New York	60⅞	55½	55½	Au.25, Se.15,	1.75
Hecla Mining	N. Y. Curb	16⅜	15½	15⅝	Au.15, Se.15 Q	0.50
Iron Blossom Con.	Salt Lake			*39	Oc.25, 1924	0.01½
Iron King Mining	Salt Lake	*55	*49	*55		
Keystone Mining	Salt Lake			*75	Au.12, Au.26	0.07½
Mammoth Mining	Salt Lake	3.00	2.80	2.90	My.15 My.25	0.10
Marsh Mines	N. Y. Curb			*4	June, 1921	0.02½
Park City	Salt Lake	5.95	5.90	5.95	Jn.15, Jy.1 Q	0.15
Park Utah	Salt Lake	5.95	5.90	5.95	April, 1924	0.15
Prince Consol.	Salt Lake	*45⅞	*43½	*44		
Silver King Coal	Salt Lake			8.60	Jn.20 Jy 1, Q	0.25
Silversmith	Spokane	*23	*22	*22	Jy.1, Jy.10	0.01
Tamarack-Custer	Spokane	*68	*60	*60	Sept, 1924	0.25
Tintic Standard	Salt Lake	13.37½	12.50	13.37½	Jn.24, Jn.29 Q	0.40
Utah-Apex	Boston	7⅛	6⅜	6⅜	Jy.3, Jy.15, Q	0.35
Western Utah Copper	N. Y. Curb			*11		
IRON						
Bethlehem Steel	New York	42¼	41	41	July, 1924	1.25
Char. Iron	Detroit			*20		
Char. Iron pfd.	Detroit			*85		
Colorado Fuel & Iron	New York	41⅜	39¼	39⅜	May, 1921	0.75
Gt. North'n Iron Ore	New York	28⅝	28	28	Ap.11, Ap.30	1.00
Inland Steel	New York	44	43	43½	Au. 14 Sep. 1,Q	0.62½
Mesabi Iron	N. Y. Curb	2⅝	2	2		
Replogle Steel	New York	15⅞	14½	14½		
Republic I. & S.	New York	50⅞	48¼	48½	May, 1921	1.50
Republic I. & S. pfd.	New York	91	90½	90⅝	Se.15, Oc.1, Q	1.75
Sloss-Sheffield S. & I.	New York	104½	99½	99⅝	Se.10, Se.21 Q	1.50
Sloss-Shef. S.&I. pfd.	New York	98	97⅞	98	Se.21, Oc.1, Q	1.75
U. S. Steel	New York	125⅞	121¼	121⅜	Au.29,Au.31,Q Ex	1.75
U. S. Steel pfd.	New York	125¼	124	124⅜	Aug. 3, Aug. 29, Q	1.75
Virginia I. C. & C.	New York			33	Jan., 1924	1.50
Virginia I.C.&C.pfd.	New York			73	Jn.20, Jy.2,	2.50
VANADIUM						
Vanadium Corp.	New York	30⅝	29½	29½	Aug.1, Aug.15	0.50
ASBESTOS						
Asbestos Corp.	Montreal	77	79	76½	Se.30, Oc.15 Q	1.50
Asbestos Corp., pfd.	Montreal	108	97½	105	Se.30, Oc. 15, Q	1.50
SULPHUR						
Freeport Texas	New York	17⅜	16	16	Nov., 1919	1.00
Texas Gulf	New York	114¼	111	112	Au.31, Se.15, Q	2.00
DIAMONDS						
De Beers Consol.	New York	24⅝	24⅝	24⅝	Jy.27, Au.30	0.97
PLATINUM						
So. Am. Gold & P.	N. Y. Curb	2⅛	2⅛	2⅛		
MINING, SMELTING, REFINING AND GENERAL						
Amer. Metal	New York	54	50¼	51	Aug. 20, Sep. 1, Q	0.75
Amer. Metal pfd.	New York			115	Aug. 21, Sep. 1, Q	1.75
Amer. Sm. & Ref.	New York	112⅜	109⅞	110	Jy.10, Au.1, Q	1.50
Amer.Sm.&Rfef.pfd.	New York	112	111¼	112	Au.7, Se.1, Q	1.75
Consol. M. & S.	Montreal	123½	118½	120½	Jn.30, Jy.15	0.75
Federated Metals	N. Y. Curb	29½	27½	29		
Newmont Mining	N. Y. Curb	44¼	44¼	44¼		
Southwest Metals	N. Y. Curb			1		
U. S. Sm. R. & M.	New York	46⅜	43⅛	45½	Jy.6, Jy.15 Q	0.75
U.S. Sm. R.&M.pfd.	New York	46⅛	46⅛	46⅛	Jy.6, Jy.15 Q	0.87½

* Cents per share. † Bid or asked. Q, Quarterly. SA, Semi-annually. M, Monthly. K, Irregular. I, Initial. X, Includes extra. The first date given is that of the closing of the books; the second that of the payment of the dividend.

Boston quotations courtesy Boston Stock Exchange; Toronto quotations those of the Standard Stock Exchange of Toronto, by courtesy of Arthur E. Moysey & Co.; Spokane, Pohlman Investment Co.; Salt Lake, Stock and Mining Exchange and George H. Watson & Co.; Colorado Springs, Colorado Springs Stock Exchange.

LONDON QUOTATIONS, WEEK ENDED AUGUST 22, 1925

	High	Low	Last	Date	Per Cent
Aramayo Mines (25 frs.)	76/3	73/9	75/—	Aug. 1925	5(c)
British Platinum	9/—	8/3	9/—	Feb. 1925	2½
Bwana M'Kubwa	6/9	6/1½	6/7½		
Camp Bird	2/—	1/11½	2/—		
El Oro	5/3	4/10½	5/1½	Nov. 1924	2½*
Esperanza	—/10½	—/9	—/10½		
Frontino & Bolivia	11/6	11/3	11/3	July 1925	3¾
Mexican Corporation	13/—	12/9	12/10½		
Mexico Mines of El Oro	37/6	33/9	37/6	June 1925	10*
Nechi (pref. 10s.)	1/3	1/—	1/3	1921-22	25
Oroville Dredging	5/9	2/6	3/6	Dec. 1923	3¾
Ouro Preto	4/6	4/3	4/3	May 1925	2½
St. John del Rey	15/7½	15/6	15/6	June 1925	6¼
San Francisco Mines	25/7½	24/6	25/3	June 1925	15
Santa Gertrudis	9/4½	8/7½	9/—	July 1920	5
Selukwe (2s. 6d.)	11/10½	9/7½	10/6	April 1917	6¾
S. American Copper	7/10½	7/6	7/9	Nov. 1917	75
Tanganyika	43/6	40/—	42/6	Sept. 1925	5
Tomboy	4/9	4/4½	4/6	Sept. 1925	5
Union Minière du Haut-Katanga (Brussels) 100 Fr	6.680	6.680	6.680	July 1925	150(b)

* Free of British income tax. (b) Belgian francs. (c) Swiss francs.